Appendix G. Public Input

G.1 Early Public Input

G.1.1 Abalone Recovery And Management Plan Commercial Constituent Workshop

Workshop Summary

The following is a summary of the first Abalone Recovery and Management Plan (ARMP) workshop, held in Santa Barbara on 26 July 2000. The workshop was intended to be an initial step in creating the ARMP which is required under Fish and Game Code §5522, and is due to the Fish and Game Commission on or before January 1, 2003. One intended outcome of this workshop was to allow commercial constituents interested in the ARMP to voice views on recovery and the future of California abalone populations. Another goal was to begin a positive dialogue with all constituents concerned with abalone recovery. Future workshops will include interested constituent groups, in order to get more complete input on the ARMP.

This summary covers the major topics discussed at the workshop, lists some of the key points brought forward, and details the next steps agreed to by the workshop participants. Names listed in parenthesis are individuals who led discussions, or made specific presentations on each topic.

Introductions (Kristine Barsky, DFG Senior Invertebrate Specialist)

Ms. Barsky welcomed the participants and introduced the Department biologists present at the workshop. Participants then introduced themselves (see participant list). She asked that everyone do several things to have a productive meeting:

- Focus on common goals
- Identify points of disagreement, and look for solutions to them
- Acknowledge the legislative mandates governing the ARMP process

Workshop Objectives, Ground Rules, and Agenda (Debra Nudelman, Senior Mediator, RESOLVE)

Ms. Nudelman is a neutral facilitator hired by the Department to assist in effective constituent involvement. She discussed her role as a guide through the process of the meeting, and a neutral leader who could help keep the group on track. Ms. Nudelman listed some ground rules for participation, so that everyone had a fair opportunity to discuss concerns without sidetracking the process or being disruptive. She also stated the main objectives of the workshop to:

- Share information about California abalone populations
- Develop preliminary perspectives on goals for the future
- Begin a constructive dialogue between the Department and constituents and decide who else might need to be involved in the ARMP process

Overview of California Abalone Population (Peter Haaker, DFG Associate Marine Biologist)

Mr. Haaker gave a summary of abalone stock decline in southern California over the past 50 years. He made it clear that even though many of his graphs used commercial abalone landings as an indicator of decline, there is a shared responsibility for the decline and many other contributing factors in addition to commercial take. These include sport take, inadequate management (managing as a group, not by species and area), poaching, pollution, habitat loss, disease, predation (mostly sea otter), and natural environmental changes (like the frequency of El Niño events in the last two decades). He spoke about how multiple abalone species supported what looked like a sustainable fishery, when in fact species composition and location of catch were shifting as individual areas and species were depleted. Workshop participants brought up several points of discussion and concerns that need to be addressed. An overriding concern, brought up here and in later discussions, was that of sea otter repopulation in southern California. It was agreed that while this was not a goal of the workshop it should be addressed when writing the ARMP. Sea otters are mentioned in FGC §5522 (a) (6) (A) where it states that measurable criteria to determine whether the goals of recovery are being met shall include "specified abundance and size frequency distribution criteria for former abalone beds within suitable habitat not dominated by sea otters" among others. Areas dominated by sea otters would not have to achieve the specified abundance and size frequency. Other participant comments included:

- Many early efforts to manage the fishery failed, these must be considered in future management
- The Commission should be directly informed of the other causes of decline, so the blame is shared among all contributing causes
- The Department should partner with other agencies to prevent causes of population decline, such as pollution and habitat loss

While Mr. Haaker stated that we can only control take, the Department should also be looking seriously at the possibility of enhancement (both larval outplanting, and translocation).

Overview and Comparisons between Northern California and Southern California Stock Status, and the Northern California Sport Fishery (Laura Rogers-Bennett, DFG Associate Marine Biologist & Ian Taniguchi, DFG Marine Biologist)

Dr. Rogers-Bennett described current abalone assessment efforts on the north coast. These studies now include both transect counts and timed swim counts. The timed swim counts were initiated to give a comparison to counts occurring in southern California. A 1999 northern California study duplicated a study done in 1986. While the total population looks very good, it is apparent that little recruitment has occurred in the past 5 years, possibly due to poor oceanic conditions. The sport fishery, however, has sustained a high level of take. Approximately 35,000 abalone stamps are sold to sport divers who take an estimated 1 to 3 million pounds of abalone each year. The average size of individual abalone taken is increasing, but again it appears that few small abalone have come into the fishery in the past 5 years. The lack of a significant

recruitment event causes some concern about the health of the abalone stock for the near future. Management recommendations to reduce sport take may be needed to insure a continued healthy stock.

Mr. Taniguchi described the current status of abalone populations in southern California. He noted that abundances at San Miguel island in the 1970s were similar to current north coast levels. Present stock, however, is well below that level. All other locations have current densities lower than those necessary to sustain any significant harvest. For both speakers the participants' comments focused on two major concerns: How is the research being conducted and how often will future surveys be done? It was acknowledged that the last survey at San Miguel Island was completed in 1999. Regular sampling is an ongoing problem that will hopefully be resolved by funding increases, a new research vessel available this year, and a higher priority for abalone research. The research methods are being modernized so that timed swim data will be more directly comparable to past and future transect data. This may even allow the conversion of abalone per hour of dive (abundance estimates) to abalone per square meter (density estimates). Another concern expressed was that southern and northern California are such different habitats that comparisons may not be realistic. The concept of managing by individual areas, not as a single region, was brought forward as a possibility.

Current Regulations and the Mandates of FGC §5522 (Kristine Barsky)

Ms. Barsky described current legal requirements for the ARMP and how they relate to the Marine Life Management Act. She apologized for the fact that commitments were previously made about when the ARMP would be completed. These commitments were made without consideration of the time involved in preparing a viable plan. This workshop was one way of trying to fulfill the intent of that commitment. The plan is due to the Commission by 1 January 2003. She also clarified the roles of current mandated abalone constituent groups working with the Department. The "Recreational Abalone Advisory Committee" (RAAC) reviews proposals and recommends projects and budgets for the expenditure of the abalone stamp fees to the Department's Director. RAAC will also make recommendations on the ARMP to the Director.

The "Director's Abalone Advisory Committee" (DAAC) makes recommendations on how to spend the commercial landing tax fund. This fund has about $255,000 remaining (approximately $420,000 was collected). When collected the fund was earmarked for enhancement. If this fund is not spent or without further legislation it will sunset and revert to the general preservation fund on 1 January 2003. Both committees have commercial diver membership.

A serious concern arose regarding the overlap in the ARMP and the Fisheries Management Plan written in 1997. The question of why the 1997 Fisheries Management Plan wasn't being used was asked. A clarification was made that the 1997 Plan became obsolete with the closure of the fishery. A draft version of the 1997 Plan exists, and will be used for parts of the ARMP. The ARMP is mandated by law, and must contain very specific sections that are not in a normal Fisheries Management Plan. It will be completed by 1 January 2003.

The Department's Initial Views on Recovery (Peter Haaker)

Mr. Haaker presented a four-tiered "conceptual framework" of recovery including recovery of the resource, fishery consideration, fishery development, and ecological consideration. He noted that any fishery must be conducted in a sustainable fashion. He also outlined criteria for a determining if a population is recovered including area, stock abundance, size distribution, and ecological condition. He noted that area, stock abundance, and size distributions must reach historical levels. Ecological condition (environmental change, ecosystem strength) must also be taken into account.

Participant comments focused on the fact that recovery must be defined specifically with numbers. While the framework listed abundances and size distributions, the question was raised as to how the specific levels would be calculated. The usefulness of landings data to "back-calculate" abundance when it is recognized by all sides that these data are not complete was questioned. It was again noted that the frequency and locations of monitoring must be set, in order to determine if specific levels of recovery are being met. Another major concern was that the idea of enhancement was still not being given more consideration. It was noted that while the speaker's primary mode for recovery was through natural recovery, the tax fund's sole purpose was supposed to be enhancement. Certain types of enhancement were discussed, and it was agreed that more research is needed to prove which are the most effective.

Finally the concept of whether recovery and a future fishery could occur together was questioned. This was a major concern, as many of the participants felt it was the only real question. Some noted that if recovery had to occur in all areas before any fishery could begin, then no fishery would occur in their lifetimes. The idea was raised that if one area or species is healthy, perhaps a small fishery could occur. The FGC was cited to note that a fishery could not adversely affect adjacent areas. Genetic studies might show whether a specific island provided young to other areas. It was agreed that this type of information is of high priority to all concerned.

Current and Future Research Goals (Konstantin Karpov, DFG Senior Marine Biologist)

Mr. Karpov discussed the Department's goals for research, and how they will be funded. These goals included habitat mapping, population monitoring, settlement and recruitment studies, enhancement, disease and parasite studies, and fishery assessment. Funding is being provided by the sport abalone stamp fund, outside grants, and Fish and Game Preservation Account funds. He asked for ideas on expenditures.

A suggestion was made to use commercial diver's knowledge of where habitat is as a means of effectively using their expertise and saving money and resources on that part of the study. Enhancement was again discussed. A concern of the Department was where the funding would come from for major enhancement efforts, and whether current science supports one or another specific type of enhancement.

Discussion Items, Identified Issues, and Concerns

At this point the meeting became more focused on bringing forward topics that could be discussed in the workshop setting, and developing ways to address them. Each participant was given the opportunity to voice a single, overriding, concern that

they wanted the group to address. The 47 individual items voiced fell into 6 general categories:

1. Sea otter management, population expansion, its effects on abalone, and the Department's role
2. How to achieve real input from constituents that the Department heeds and the need for more constituent involvement in both management and research
3. Research and monitoring issues: what types of research are necessary, when and how monitoring will occur, and how will specifics of recovery be defined
4. The need for more enhancement activities on the short and long term timeline
5. The need for appropriate and sufficient enforcement to support recovery
6. What will the actual products of this meeting be?

Many of these categories were discussed briefly and some specific suggestions of how to address the identified concerns were made. Listed below are some of the participant's suggestions:

- Experience from New Zealand and Australia should be utilized
- there should be an efficient system to monitor and change catch limits (adaptive management)
- Catch limits should be based on quantitative data; densities for sustainability
- There should be several surveys of San Miguel Island each year to determine a baseline for sustainability
- Collecting data from the south coast should be an interim goal
- There should be a survey to bring local knowledge into the decision making process and acquire some of the baseline data
- We should not have the same density goals in all areas
- Enhancement is an important way to help recover this fishery

Participants' Views on Recovery

The discussion of concerns led to a need for clarification of what could realistically be accomplished at the single day workshop. Questions were asked of the group to elicit responses that would provide an initial view of recovery:

- What is recovery?
- What is the definition and criteria for measurement?
- What is "sustainability"?
- What are the commercial constituents' realistic goals for the future?
- What does a healthy fishery look like?

The definition of "sustainable" was discussed briefly and answered more fully by a quotation from FGC §99.5: "Sustainable," "sustainable use," and "sustainability" with regard to a marine fishery, mean both of the following:

A. Continuous replacement of resources, taking into account fluctuations in abundance and environmental variability.

B. Securing the fullest possible range of present and long-term economic, social, and ecological benefits, maintaining biological diversity, and, in the case of fishery management based on maximum sustainable yield, taking in a fishery that does not exceed optimum yield.

It was also noted that definitions of many of the terms used are defined in the Code. A definite short-term goal of defining recovery, from the Department's perspective, was asked for. The participants showed a real desire to help with enhancement and research activities. A discussion of how this might happen resulted, and the Department gave some information on hindrances to their ability to work with outside contractors. Two major problems were in the areas of liability insurance for boat operators, and coverage for divers working for the Department. The biologists showed a desire to help overcome these obstacles. Participants also felt that it would be important to identify areas that are healthy as well as areas in need of recovery.

Since the definition of recovery is critical to the ARMP, the participants discussed methods for creating specific definitions that would be acceptable to the commercial constituents. One suggestion was that recovery should at least be a set number of abalone per square meter. The suggestions included:

1. Recovery should at least be a set number of abalone per square meter. Possible approaches to determine this density include :

    - Densities on the north coast
    - Densities seen in healthy fisheries elsewhere (New Zealand, Australia)
    - The diver's knowledge of historical populations
    - Densities within areas dominated by sea otter

2. Populations should be monitored by conducting at least 2 surveys per year in each of several pre-determined sites. These sites should be chosen taking into account the diver's input.
3. Because each area may be different, recovery should be based on a separate goal in each area, and the existence of normal environmental cycles should be included.

Next Steps

As a final product of the workshop, specific short-term steps were agreed upon. These steps were based on ideas and concerns raised throughout the day. A goal of having at least one Department employee and one commercial constituent as co-chairs of work-teams for each item was stated. The work-teams will report back at the next workshop to update all concerned parties on accomplishments and future needs. Each of these steps is listed below, along with the names of those who stated an intent to help with the work-teams:

1. Develop an anecdotal fishery data form and distribute it to sport and commercial divers. This form will be used to identify sites that have or had abalone populations and to choose index sites for monitoring that are acceptable to both the divers and the biologists (Jim Marshall, Jim Finch, Carl Nienaber, John Ugoretz--this form is

intended to be distributed by the end of September).
2. Develop a way to determine projects needed to fulfill interim recovery goals to successfully complete the ARMP (John Colgate, Dave Parker, Ian Taniguchi).
3. Determine the steps necessary to begin larval out-planting. This will include research needs, permitting issues, possible Sea Grant matching funds, and other topics (Kristine Barsky, Laura Rogers-Bennett, Sam Shrout, Phillip Sanders, Pete Haaker).
4. Attempt to solve insurance issues regarding allowing the commercial divers to work with the Department in research and enhancement (Kristine Barsky).
5. Determine genetic studies which need to be conducted, and locate possible funding sources (Kon Karpov, John Colgate).
6. Explore the idea of forming an Abalone Council, to help with issues surrounding the ARMP and determine how this group will fit in with RAAC and DAAC (Michael Harrington, Kon Karpov, John Ugoretz, Debra Nudelman).

Shortly after the workshop it was determined that two planned scoping sessions would address at least some of the identified concerns. These two sessions could take the form of broad constituent input workshops, rather than an actual council.

Workshop Summary and Adjournment (Debra Nudelman & Kristine Barsky)

Ms. Nudelman briefly summarized the highlights of the workshop. Ms. Barsky thanked the participants for their hard work and efforts. The workshop was adjourned at 5:00 pm.

Participants

Betts, Jerome	Commercial Diver
Brooker, Craig	Commercial Diver
Brown, Locky	Sport Diver
Colborn, Katherine	Marine Life Management Project
Colgate, John	Commercial Diver
Douglas, Jeff	Commercial Diver
Duncan, Bob	Commercial Diver
Finch, James	Commercial Diver
Frederick, Gabriella	Senator O'Connell's Office
Graziano, Norman	Commercial Diver
Gritsch, Jeff	Commercial Diver
Harrington, Michael	Commercial Diver
Liquornik, Harry	Commercial Diver
Marcus, Leonard	Commercial Diver
Marshall, Jim	Commercial Diver
Mcbride, Susan	Sea Grant Marine Advisor
Nienaber, Carl	Commercial Diver
O'Brien, Trudi	Commercial Diver
Packard, Michael	Commercial Diver
Pattie, Ian	Commercial Diver
Pettersen, Carlton	Commercial Diver
Rebuck, Steve	Industry Consultant
Richards, John	University of California
Sanders, Phil	Commercial Diver

Shrout, Sam	Commercial Diver
Thompson, Don	Commercial Diver
Voss, Chris	Commercial Diver
Williams, Richard	Save Our Shellfish
Wilson, Darrel	Commercial Diver
Zertuche, Ruben	Commercial Diver

G.1.2 Abalone Recovery and Management Plan Advisory Panel

The Abalone Recovery and Management Plan Advisory Panel was established to aid Department biologists with the development of the ARMP. The advisory panel was made up from constituents and experts representing as broad an interest base as possible including environmental organizations, scientists, aquaculturists, commercial and recreational fishermen. Two advisory panel workshops were held to provide the department with advice, feedback, and recommendations regarding the issues and actions that need to be included in the ARMP. Prior to both workshops, ARMP panelists and alternates received a workshop overview and specific focus questions. All the advisory panel workshops were open to the public, and a comment period was provided at each meeting.

G.1.2.1 Abalone Recovery and Management Plan Advisory Workshop 1; Summary, 16 November 2001

Department of Fish and Game Offices
4665 Lampson, Suite C
Los Alamitos, CA 90720

The following is a summary of the Abalone Recovery and Management Plan (ARMP) Advisory Panel workshop, held in Los Alamitos on 16 November 2001. The ARMP Advisory Panel is composed of members and alternates representing commercial and sport abalone fishermen, environmental organizations, aquaculturists, and scientists. The Department of Fish and Game (Department) established this panel to obtain input and advice from a broad interest and experience base. The purpose of this workshop was to receive input on southern California abalone recovery.

Prior to the workshop, ARMP panelists and alternates received a workshop overview which included a review of potential recovery measures to be considered, and specific focus questions for the panel to answer. The objectives for this workshop were to: 1) review and comment on interim and long-term recovery goals and criteria; and 2) evaluate suggested means of recovery and suggest alternative or additional approaches not considered. The workshop was led by Mr. Paul De Morgan, of *RESOLVE*, a neutral facilitation organization based in Portland Oregon.

<u>Welcome, Opening Comments, Introductions, Agenda Review</u>

Ms. Patty Wolf, Marine Region Manager, and Mr. Pete Haaker, Senior Marine Biologist, welcomed the panel and thanked them for their efforts to aid the Department in the development of the ARMP. The facilitator, Mr. Paul De Morgan, led the introductions of Department staff and panel members present. He then reviewed the

proposed workshop objectives and agenda. Ms. Diana Watters, Associate Marine Biologist, briefly reviewed logistical items for the workshop.

Overview of Advisory Panel Purpose

Mr. Pete Haaker presented an overview of the panel's purpose. He explained that the panel's input, comments, ideas, and suggestions would be used to assist the Department in the development of the ARMP. This workshop provided the Department with the opportunity to hear from the panelists regarding the Department's preliminary approach to the recovery portion of the ARMP.

Mr. Haaker presented a brief history of the abalone fisheries in California. He noted that five of the seven endemic species were important in the fishery, with all species occurring in the south, and two occurring in the north part of California. He reviewed the current moratorium for commercial and recreational abalone fishing south of San Francisco, and the recreational fishery which operates north of San Francisco.

Mr. Haaker explained that the Department felt that recovery of southern abalone, while related, is different in scope and nature from management of the northern recreational fishery. As such, the Department is addressing these two subjects separately in the ARMP. He reiterated that the focus of this workshop would be issues associated with recovery of southern California abalone stocks. Management of the northern California recreational fishery would be the focus of the next workshop planned for Spring 2002. He explained that members of the public attending the meeting would have an opportunity to comment on workshop topics during a working lunch. He introduced Department abalone team members who would be presenting information to the panel.

It was explained that most of the work to be completed for the day would take place during the panel discussion after the Department presentations. The panel was asked to: 1) address the conceptual framework for recovery; 2) evaluate the Department's approach to development of the ARMP; 3) address the focus questions about interim and long-term recovery goals, criteria, and activities; and 4) suggest alternative approaches which have not been addressed. He added a final note of appreciation for the panel members' time and concern.

Presentation: Review of Fish and Game Code and Biology of Abalone

Mr. Konstantin Karpov, Senior Marine Biologist, reviewed the legal framework guiding abalone management and the ARMP. Federal laws which have implications for abalone management and which supercede state law include the Endangered Species Act and the Marine Mammal Protection Act. These two federal laws affect sea otter and white abalone management. Mr. Karpov next explained the California law, under Fish and Game Code §5521, 5521.5, 5520, and 5522, which pertain to abalone and the ARMP. Section 5521 addresses the moratorium on the recreational and commercial take of abalone south of San Francisco; §5521.5 addresses the closure of the commercial fishery for abalone north of San Francisco; §5520 explains the Legislature's intent with regard to abalone management; and §5522 addresses the ARMP's content and due date (on or before 1 January 2003), as well as provisions for reopening abalone fisheries (the Department may apply to reopen the abalone fishery on or before 1 January 2008).

Presentation: Biology of Abalone

Ms. Jennifer O'Leary, Marine Biologist, reviewed the biological aspects of abalone that present challenges to recovery. Abalone are long-lived (30 years or longer), slow-growing (10 to 14 years for red abalone to reach the minimum sport legal size), and have highly variable recruitment (successful reproductive years). Ms. O'Leary explained the Allee effect, a minimum density below which abalone cannot reproduce successfully. The Allee effect contributes to the vulnerability of abalone stocks to collapse at low densities. The limited distance that abalone larvae are able to disperse limits their ability to re-colonize depleted areas. Ms. O'Leary pointed out that abalone fisheries cannot coexist with sea otter populations. Sea otters consume 25% of their body weight per day, and abalone is one of the primary food items. Withering syndrome was a contributor to the decline of abalone populations in southern California, and must be considered in recovering populations.

Presentation: Interim and Long-term Recovery Goals and Criteria

Mr. Pete Kalvass, Associate Marine Biologist, presented a conceptual framework for recovery, based on a model created by Restrepo et al. (1998). The model provides a potential means for measuring recovery, interim and long-term recovery goals, recovery evaluation criteria, and timelines for recovery, all of which are required for the ARMP. The presented model was developed to measure the rebuilding of finfish fisheries as part of the National Standard Guidelines in the federal Magnuson-Stevenson Fisheries Act. The model uses biomass at maximum sustainable yield as a measure of recovery. The boundaries between over-fished, recovering, and sustainable status are based on proportions of the biomass level at maximum sustained yield.

The proposed long-term goal of the ARMP is to rebuild depleted stocks in southern California to a maximum sustainable level with robust size distribution in former abalone beds. The proposed interim recovery goals include: 1) prevent extinction; 2) re-establish sustainable abundances with robust size distributions at former abalone beds; 3) attain biomass levels with sufficient surplus stock to warrant consideration of re-establishing a fishery. Mr. Kalvass explained how red abalone densities on the north coast, where red abalone are relatively abundant, could be used to set a biomass at maximum sustainable yield for the recovery model. This could serve as a proxy for the abundance criteria for recovery of southern California abalone stocks.

Presentation: Recovery Activities

Mr. Ian Taniguchi, Associate Marine Biologist, discussed the pros and cons of various recovery techniques, as well as their implementation. Recovering depleted stocks can be achieved using a range of activities to prevent extinction, assist in the recovery process, and increase recovery goals. Recovery techniques being considered include: translocation of adult stock from one area to another, aggregation of adult abalone within an area, larval out-planting, captive breeding programs, and establishing marine protected areas. The recovery program will require an assessment strategy to evaluate the effectiveness of each stage of recovery on a species by species basis. Assessments will be integrated into statewide research protocols that are currently

being developed by the Department with collaboration from other state and federal agency researchers. The necessity for recovery actions will be reevaluated as abalone populations recover to self-sustainability.

Public Comment During Lunch

During the lunch break, members of the audience were given the opportunity to provide input. Mr. John Richards, with the University of California's Sea Grant Extension Program, made a general announcement explaining his involvement with Sea Grant and potential sources of information and funding available through Sea Grant.

Advisory Panel Discussion of Interim and Long-term Recovery Goals and Criteria

Comments made by the panel members are summarized here. The comments are in response to focus questions presented to the panel by the Department's Abalone Team, which is responsible for developing the Abalone Recovery and Management Plan

Q: Are the interim and long-term goals valid?

1. Several panel members expressed concern about the long-term goal of reopening an abalone fishery in southern California because the stocks are currently so depleted. It was recommended that this goal not be part of the plan. Rather, the immediate goal should be to recover these stocks and design a specific step-by-step plan for doing so. Such a plan should include research methods to assess the success or failure and cost-effectiveness of the methodologies employed.
2. The panel was concerned about reopening a limited fishery once the population reached the minimum B_{msy}, suggested by the Restrepo et al. (1998) model. This concern was linked to the applicability of the Restrepo model to invertebrate populations.
3. It is likely that sea otters will expand their range, and this should be considered for recovery of southern abalone stocks. The U S Fish and Wildlife Service (USFWS) has not implemented the capture and relocation provisions of the 1987 Sea Otter Translocation Plan since early 1993, thus allowing natural expansion of the otter population into southern California. The USFWS is currently evaluating whether failure criteria in the Translocation Plan have been met. If deemed a failure, there are no legal mechanisms for limiting sea otter range expansion. Therefore, if the long-term goal is to recover southern California abalone stocks to the point that a fishery can be reopened, that goal may be unattainable because of sea otter recolonization in southern California. The U.S. Fish and Wildlife Service should work together as partners on this situation.
4. It was suggested that recovering a population to prevent extinction is a different goal than recovering a fishery. These two goals have different approaches which should be specified. The interim and long-term goals for the two kinds of recovery must be clearly defined and measurable.

5. The recovery plan needs to be able to address the habitat quality at different locations for different species.
6. The plan should be able to address the problem of incidental take if a fishery is reopened for fewer than all the species of abalone.
7. Some panel members thought the interim goal of preventing extinction is redundant.

Q: Are there additional interim and long-term goals that should be considered?

1. Re-ordering the interim and long-term goals was suggested. Some members felt management steps should come earlier in the process of recovery. There was some interest in the reopening of a fishery at the minimum biomass levels, but it was pointed out that this would extend the period for achieving maximum biomass levels.
2. Add more interim goals to deal with various aspects of recovery; some of the long-term goals should be interim goals.
3. Organize goals into stages of recovery (I, II, III, etc.) with specific triggers to signal transition into next stage.

Q: Are the long-term goals appropriate for all five species?

1. There should be realistic specific goals for each species. One panel member suggested linking red abalone recovery goals to specific areas such as San Miguel Island.
2. Do not consider reopening fisheries for black and green abalones. These species are found in very shallow, restricted habitats and are too available to divers. Even limited take could have serious negative effects on populations.

Q: Do you agree with the criteria as described?

1. The panel felt that the recovery criteria presented did not adequately address Section 5522.6c, which pertains to the importance of areas proposed for reopening and the potential impact to the recovery of adjacent areas. Some panel members pointed out that some areas where abalone were found are no longer suitable for populations because of habitat loss and ecological changes.
2. Triggers: Several panel members disliked the use of B_{msy} (or maximum sustained yield (MSY)) because they felt more data is needed to form the basis of a model. Some felt that 30% of B_{msy} is not a conservative threshold for a slow growing animal. These comments relate to the idea that the Restrepo model was inappropriate for application to invertebrates.

Q: Do you have any additional suggested criteria for recovery?

1. If B_{smy} is used as a recovery criteria, there should be a clear measure for setting it (the perception was that the Department does not have a clear measure). The use of optimum yield (OY) in place of MSY was suggested.

2. Develop specific research protocols for stock assessment.
3. Incorporate university research and cooperative research efforts with abalone fishers.
4. Establish a method to assess the effectiveness of these criteria as they are implemented.
5. Age and growth data should be collected as it may be useful for making predictions about the future settlement and recruitment.
6. Look to work done in Australia to use as a model for research and management (for example, Alistair Hobday's work).
7. Begin gathering data immediately at San Miguel Island so that this data will be available for future assessments.
8. Hold off on setting a maximum threshold for establishment of a fishery. In the interim, all work should be directed towards rebuilding stocks.
9. Choose marine protected area (MPA) sites for abalone as soon as possible. Choose sites that can be protected by wildlife protection (WLP).
10. Incorporate these MPA sites into the current MLPA and MERWG processes as soon as possible.
11. The recovery plan presented lacks the flexibility to manage for differences in habitat quality among different populations, or for incidental take if a fishery is reopened in southern California for some species.

<u>Advisory Panel Discussion of Recovery Activities</u>

Review and comment on recovery activities:

1. Several panel members stressed the critical need for assessment and filling data gaps. More research is needed in areas such as genetics for stock identification, density determination, effectiveness of abalone recruitment modules (ARMs), etc.
2. The members were concerned about using fishery-dependant data in developing assumptions to be used in management plans.
3. Larval out-planting and aggregation methods are uncertain in their ability to enhance natural stocks. Thus, more traditional monitoring of abalone populations is crucial. Aggregation experiments and ARMS have been unsuccessful so far. The actual cause of mortality is unknown. Experiments are needed to determine the validity of these recovery activities.

4. Focus on designing experiments appropriate to recovery activities.

   Q: Can you evaluate suggested means of recovery and suggest alternative or additional approaches not considered?

   1. Establish a data monitoring program and research methodology to determine the level of recovery for populations.
   2. Conduct experiments to test the effectiveness of recovery treatments. One could use a BACI (before-after control-impact) approach with a sufficient number of replicates (e.g. 6 per site).

3. Establish MPAs (for control sites) on Santa Cruz, Santa Catalina, and Santa Barbara Islands. Protect sites with effective enforcement. Recovery techniques must be linked to MPAs to protect stocks.
4. Panel members suggested a compilation of existing data and literature be assembled. Funding could be sought from private and public grant agencies. Sea Grant Rapid Response funding was suggested.
5. A recruitment model would be helpful to evaluate which sites to enhance, but there is an absence of the data to generate such a model.
6. Baseline population genetic data is needed but difficult to obtain. Could look at recruitment and test for genetic homogeneity.
7. A panelist advocated using aggregation rather than translocation because the areas chosen should have similar habitat and population structure. There was also concern about the spread of disease and parasites during these operations.
8. Consider habitat grooming to aid larval out-planting. Such techniques as using coralline covered rocks in out-planting operations should be investigated as a technique for enhancement..
9. Consider not applying enhancement techniques in certain areas; and there should be criteria about when to cease enhancement techniques, i.e., when population recovery is evident.
10. Consider ocean current patterns when doing translocation studies to identify potential source and sink populations.

Additional focus questions posed to the panel based on the morning discussion:

Q: Does the model (Restrepo et al. 1998) make sense? Are there alternative models?

1. Several panel members thought the Restrepo model was inappropriate for invertebrates and that it is not sufficiently conservative.
2. In place of a Restrepo model, develop a model that includes individual growth rates, fecundity, size data, an estimate of mortality, and genetic connectivity between populations/stocks.
3. A Skillam model was suggested as an alternative to Restrepo.
4. A population model, rather than a fishery model was suggested.

Q: Are northern California stock densities appropriate for southern California recovery criteria?

1. Density at San Miguel Island was suggested by one panel member to be a more realistic proxy for southern California recovery criteria.

Panel requested clarification and /or definition of the following terms/ideas:

1. Robust size distribution
2. Self-reproducing population

3. How surplus stock will be measured
4. Definition of former abalone bed

Next Steps

Mr. Paul De Morgan led a discussion of the next steps for the panel and the Department to take or consider taking:

1. Explore funding opportunities (e.g., Sea Grant, NFWF) for development of an Abalone-Data Library - Pete Haaker, Lead; Kate Wing, advice.
2. Consider getting support of full panel behind the funding requests - would require drafting a proposal and sending out to the panel members for endorsement.
3. Establish a science subcommittee - Pete K., Lead; Ron Burton, Tom Ebert, Steve Schroeter.
4. Obtain and examine "raw" existing data.
5. Further develop ideas for alternative models.
6. Draft and distribute for comment a summary of the proceedings to all panel members.
7. Schedule the March meeting.
8. Consider adding a half-day of meeting in March to discuss recovery related issues.
9. Consider convening conference calls to discuss issues (e.g., new models) prior to the next meeting.
10. DFG will consider potential MPAs and share their views on the most valuable marine areas for abalone recovery with the panel members.

Participants

Ben Beede	panel member
Tom McCormick	panel member
Kate Wing	panel member
Jim Curland	panel member
John Colgate	panel member
Jim Marshall	panel member
Michael Henderson	panel member
Stephen Benavides	panel member
Gregory S. Sanders	panel member
John Butler	panel alternate
Ron Burton	panel member
Stephen Schroeter	panel member
Thomas Ebert	panel member
Carolyn Friedman	panel member (participated by phone)
Pete Haaker	Department of Fish and Game (DFG)
Kon Karpov	DFG
Peter Kalvass	DFG
Jennifer O'Leary	DFG
Ian Taniguchi	DFG
Mary Bergen	DFG
Kelly O'Reilly	DFG
Diana Watters	DFG

Jonathan Ramsay	DFG
Patricia Wolf	DFG
Fred Wendell	DFG
Paul DeMorgan	Resolve, Inc.
John Richards	Sea Grant

G.1.2.2 Abalone Recovery and Management Plan Advisory Workshop 2; Summary; March 15, 2002; Oakland, CA

Elihu Harris State Office Building
1515 Clay Street
Oakland, CA

Members of the Abalone Recovery and Management Plan (ARMP) Advisory Panel and the Recreational Abalone Advisory Committee (RAAC) met on March 15, 2002, to provide input to the Department of Fish and Game (DFG) on northern California abalone management. The objectives of the workshop were to:

- Evaluate and comment on the proposed management approach; and
- Evaluate and comment on alternative management strategies and refinements and make additional suggestions.

The ARMP Advisory Panel is composed of individuals representing commercial and sport abalone fishermen, environmental organizations, aquaculturists, scientists, and others. The panel was established by DFG to obtain input and advice from a broad range of interests on efforts to develop the ARMP. The RAAC is an on-going Committee advising the DFG on issues associated with the recreational abalone fishery. Copies of presentation slides and other materials distributed at the meeting may be obtained by contacting Diana Watters, at (650) 631-2535, or dwatters@dfg.ca.gov.

Welcome and Opening Remarks

Pete Haaker, senior marine biologist, CDFG, welcomed everyone to the workshop. He noted that the Department was holding the workshop to solicit comments and suggestions from various perspectives, including those of biologists, non-governmental organizations, and recreational divers. He explained that the workshop included both the ARMP Advisory Panel and the RAAC in order to broaden the range of expertise and comments.

Introductions and Agenda Review

Paul De Morgan, RESOLVE, introduced himself and explained that as facilitator of the workshop he would 1) ensure that CDFG had an opportunity to present the proposed management approach and the rationale behind it and 2) ensure that everyone had an opportunity to comment on the proposed approach and rationale.

After members of the ARMP Advisory Panel, RAAC, CDFG staff, and audience introduced themselves. Mr. De Morgan reviewed the agenda and other materials presented to the workshop participants. He outlined the ground rules for the workshop

and asked the ARMP Advisory Panel and RAAC members to focus their comments on the management aspects of the proposed plan.

Update on Progress since First ARMP Workshop and Overview of Workshop Purpose

Before providing the update, Mr. Haaker offered the apologies of Patty Wolf, marine region manager, CDFG, and Fred Wendell, acting northern marine manager, CDFG, who were unable to attend the workshop but have been very involved in developing the ARMP.

Mr. Haaker reported that CDFG has been seeking funding for the abalone data library, but no funding has been secured yet. He said that in response to comments on the importance of marine protected areas (MPAs) he and Dr. Laura Rogers-Bennett, associate marine biologist, CDFG, had evaluated all of the proposed MPA sites for their potential benefit to abalone. He noted that a consideration was that sites for concentration of abalone must be able to be protected or located in remote locations. He said that many of the proposed sites are in the vicinity of major population centers and probably would not be useful in abalone work. He also reported that Department staff had provided southern California abalone tagging and cruise data to the scientific subcommittee.

To help illustrate the connectivity of recovery and management, Mr. Haaker presented a general model for the ARMP.

Konstantin Karpov, senior marine biologist, CDFG, explained that the Department is developing a management plan that is precautionary in a data-poor environment and uses an empirically derived total allowable catch (TAC). He said that the starting point for the proposed plan is the recent Fish and Game Commission action. He commented that the Department considers the plan a living document, allowing for refinements as more data become available and the science progresses. Mr. Karpov said that the proposed plan includes criteria that will "trigger" management actions based on the conditions of the abalone stocks and environment. He explained that in plan development, the Department is considering local area closures to protect the resource from localized depletions. He said the Department also is considering closing and opening fisheries as area-wide recovery dictates, thus linking proposed management to the recovery portion of the ARMP. In closing, Mr. Karpov commented that the Department's staff was open to comments and critical thinking on the proposed management approach.

Status of Stocks and Management Considerations

Jerry Kashiwada, marine biologist, CDFG, presented an overview of the status of abalone stocks and management considerations. He presented historical data on the serial depletion and overall decline of red abalone in central and southern California. He listed the fishery-dependent and fishery-independent assessment sites for northern California, commenting that the limited number of sites contributes to the data-poor scenario. He outlined the data on the northern red abalone fishery that indicate current trends of concentrated fishery effort and increased take, few young abalone, declines of deep-water stocks, and serial depletion in high-use areas. Mr. Kashiwada said that earlier this year, the Fish and Game Commission considered these trends and lowered the daily bag and possession limit from four abalone to three and the annual limit from

100 to 24. He commented that the new limits result in a projected annual take of 430,000 abalone.

In response to questions, DFG staff made the following comments:

- Estimates of poaching (such as the number of people stopped who do not have an abalone report card or who have more than the bag limit) are developed primarily from information collected at enforcement checkpoints. "Black market" poaching is much more difficult to estimate.
- About 1-2% of fishermen caught their annual limit of 100 abalone under the old regulations. The average annual catch was 18 abalone. In 2001 there were approximately 40,000 fishermen.
- CDFG estimates bar-cut mortality at 2-3%, which is lower than in the past due to current gear regulations and education efforts.

A member commented that despite all the effort going toward abalone, the scenario is still data-poor. Dr. Rogers-Bennett noted that the Department is just beginning to receive data from increased research efforts supported by funds from the abalone stamp.

Proposed Management Approach

Peter Kalvass, associate marine biologist, CDFG, and Jennifer O'Leary, marine biologist, CDFG, presented an overview of the proposed management approach. Mr. Kalvass explained that the proposed plan is based on an empirically determined total allowable catch (TAC) of 430,000 abalone. He said that under the proposed plan total catch would be measured annually, post-season, and the Department would conduct a review every other year to determine if the TAC is being met with existing regulations, to determine if alterations of the TAC are warranted based on the established criteria, and to evaluate the sustainability of local areas.

Mr. Kalvass outlined the proposed criteria for recruitment, density, occurrence of adverse effects, and serial depletion and explained how each was developed. He noted, however, that since completing the document submitted to the panel ("Overview of Abalone Recovery and Management Plan Workshop on Management") the Department had reconsidered the adverse effects criterion. He said the staff decided to propose the disease criterion but not the other adverse effects criterion, believing that not enough is known about El Niño, poaching, and sea otters to make strict criteria on them. He noted that the disease criterion distinguishes between a minor event (5-20% of stocks affected) and a major event (more than 20% of stocks affected).

Ms. O'Leary explained how the criteria work within the decision tables. She reviewed the fishery-wide TAC decision table, outlining the combinations of criteria (recruitment, density, and adverse events) that would dictate increasing the TAC, maintaining the TAC, decreasing the TAC, closing the fishery, or reopening the fishery. She noted that the maximum TAC would be set at 25 % above the base TAC of 430,000 abalone per year. She offered an example of a situation in which the criteria would require reducing the TAC.

Ms. O'Leary also reviewed the localized area closure decision table. She outlined the combinations of criteria (density, serial depletion, and adverse events) that

would trigger a survey to determine if density in the area is approaching minimal viable population, closure of an area, or reopening of a closed area. She noted that if an area were closed, the overall TAC would be reduced proportionately to prevent increased take in the remaining open areas. Ms. O'Leary also explained that a localized area that met the criteria for reopening would not be reopened if the entire fishery were closed (i.e., these criteria would not apply to localized areas in the southern fishery until the entire fishery met the criteria to reopen a fishery).

Ms. O'Leary listed the tools currently available to the Department to manage the fishery: gear restrictions, size limits, area closures, seasonal closures, daily limits, and annual limits. She commented that these tools may be refined or others may be added in the future and noted that daily and annual limits are the primary tools currently being used to adjust the TAC.

In response to questions, CDFG staff made the following comments:

- It takes from 5 to 10 years for an abalone to grow from emergent size to harvestable size; however, growth rates vary greatly in response to food source and some abalone may take several more years to grow from emergent to harvestable size.
- The fishery-dependent surveys are designed around access sites, with high use sites serving as index sites. There are no strict criteria for defining the boundaries of the sites, though the fishery-dependent surveys generally extend as far as the fishermen go. CDFG would prefer to have a different, random frame if it were possible. Monitoring a consistent area is likely more important than where the boundaries of sites lie.
- The biennial review of the TAC will coincide with the 2-year cycle of the Fish and Game Commission's regular sport fishery review. Total catch will be monitored annually, and it would be possible to make adjustments within the 2-year period if the situation warranted it.
- Estimates of the extent of withering syndrome at San Miguel Island in 1993 are based on data from CFG cruises, which indicated that up to 5% of abalone examined at some individual sites were affected by the disease.

A panel member noted that for the serial depletion criteria, a "significant" increase in distance from access point or "significant" decline in catch per unit effort (CPUE) means a *statistically* significant increase or decline, which may be large or small in magnitude and may or may not be biologically significant.

Refinements of the Proposed Plan and Alternative Management Strategies

Dr. Rogers-Bennett presented some of the CDFG staff's ideas of refinements and alternatives to improve the plan as new information becomes available. She noted that these refinements and alternatives will not be included in the first ARMP. Dr. Rogers-Bennett focused on five areas:

- *New criteria* - Aggregation criteria or criteria on the effects of El Niño, poaching, and sea otters may be incorporated in management decision making.
- *Marine protected areas* - MPAs may be established in shallow habitat to provide insurance against stock collapse.

- *Alternative management strategies* - Rather than a TAC-based strategy, the plan could use an area-based management strategy, which would adjust the amount of habitat reserved from fishing according to criteria.
- *Alternative approaches for setting TACs* - The proposed plan uses previous fishing levels to set the TAC. Alternatively, if data were available to support the methods, the TAC could be set based on a surplus production model or in response to the environment.
- *Additional quantitative methods* - Refining estimates of population parameters (growth, mortality, and reproduction) or modeling proposed management strategies could help to evaluate management options.

In response to questions, Mr. Karpov clarified that the TAC in the proposed plan does not assume any closed areas; if any areas are closed, as MPAs or for other reasons, the TAC would be lowered proportionately.

A member commented that the effects of MPAs may be counterintuitive. She gave the example that if an MPA included urchins, an increase in their population could reduce the amount of kelp in the area, which in turn could hurt the abalone population. Another member commented that CDFG staff should ensure that MPAs are beneficial for abalone. Dr. Rogers-Bennett noted that biologists do not understand all the intricacies of species interactions. CDFG explained that Mr. Haaker serves as a link between the ARMP and the MLPA processes, providing information on the potential effects of proposed MPAs on abalone. A member pointed out that unless an MPA is closed to all fishing it is difficult to prevent poaching.

Discussion of Overall Plan

Focus Questions:

- What is your general reaction to the proposed management approach?
- Will it result in a sustainable fishery?

Several members commented that generally the proposed approach is good, given the data limitations.

A member expressed concern about basing decisions on data averaged across all sites and asked whether this was the best approach given the difficulty of predicting recruitment. Another member responded that treating the fishery as one unit may be the best approach since so little is known about the interconnections among sites from a population standpoint.

Several members commented on the need for CDFG to prepare a research plan that states priorities and timeframes for filling various data gaps. One member noted that clear priorities and rationale would be helpful in seeking funding from outside sources and or competing for limited state research funding. Comments on specific areas of research included:

- CDFG needs to determine the extent of abalone habitat (and the extent of accessible abalone habitat) in order to estimate the size of the fishery reliably.

- CDFG needs to outline what additional information it will gather and use to assess and prevent serial depletion. Site-specific data are important as different sites will need to be managed differently. Site-specific reporting on the abalone report cards is a good start.
- The data need to cover the entire area. In particular, research should determine both where the juveniles are and what is happening in the grazer areas where the larger abalone reside.
- Data on connectivity of sites are important but extremely difficult to obtain given current technology. The use of non-genetic tracers as a way to identify larval sources was suggested.
- Data on settlement of postlarvae would be very useful as they provide an indication of the future population. Settlement collectors would be preferable to Abalone Recruitment Modules (ARMs) if an effective collector could be developed for abalone.
- CDFG should work to determine what impacts (e.g., fishing, El Niño, sea otters) have the greatest effect on abalone.

A member commented that when the Department's approach is to err toward conservation in a data-poor scenario, the Department may implement closures that fishermen believe are not justified. He said that adequate research and funding may alleviate some of this negative reaction.

Additional comments included the following:

- The plan should include a law enforcement component.
- The plan should include quantitative criteria to allow the public to evaluate whether CDFG is achieving its goals.
- The areas most heavily fished are those that are most accessible, not necessarily those that are most productive.

Public Comment

E. A. Flynn - Mr. Flynn requested that the RAAC consider opening San Mateo County to recreational abalone fishing. He commented that opening San Mateo County would reduce fishing pressure on other counties and would also show how 5 years of closure had helped the abalone recover. He reported that he had observed an eighteen-fold increase in abalone in one area.

Paul Weakland - Mr. Weakland expressed concern about the lack of abalone data and the resulting choice by CDFG to err on the side of conservation. He commented that all disease events should be considered major rather than using the proposed two-tier classification. He suggested that CDFG increase the minimum size requirement for harvestable abalone in order to increase abalone populations. He commented that 52 of the 104 existing MPAs are closed to abalone fishing and questioned why more MPAs are being identified when it is unknown whether the existing ones have benefitted abalone. He also requested that CDFG report the margin of error on its surveys.

Harold M. Hoogasian - Mr. Hoogasian stated that raising the minimum size requirement is the easiest way to increase the abalone population. He commented that the Department's estimates of poaching are a gross underestimate and that commercial poachers are causing a lot of damage. He said that the abalone stamps are too inexpensive and suggested that fishermen would be willing to pay more if they knew the money were going toward research. He also suggested that fishermen would be willing to give CDFG a tissue sample from the abalone they catch so that the Department could do a genetic population sample.

Discussion on the Proposed Criteria

Focus Questions:

- Will the criteria assist the Department in determining fishery adjustments?
- What is the best proxy for good recruitment: emergent or invasive densities, or a combination of both?
- Is it reasonable to use average densities from emergent surveys at three index sites as the sustainable population density target in northern California?
- What measurable criteria could be used for El Niño events and poaching?
- Should sea otter expansion trigger localized or total closure?
- Are the definitions of minor and major disease events logical?
- Are there additional criteria that the department should consider?

A member suggested that the CDFG staff draw on the formal body of literature on decision making matrices to help develop the plan. She commented that the literature could offer methods of incorporating uncertainty into decision making and methods to take advantage of expert opinions as well as quantitative information.

Members discussed the advantages and limitations of survey methods. Several expressed concern about the impact of invasive surveys on the reef habitat, and some noted that invasive surveys are time consuming and labor intensive. One member commented that due to the long time it takes for abalone to grow from emergent size to harvestable size, CDFG can use emergent survey data to evaluate the fishery and effect management changes, making the invasive surveys unnecessary. Another member noted that emergent surveys do not adequately capture the 'hidden' part of the population which could lead to over- or under-estimations of stock trajectories. Some members recommended that the DFG should continue to utilize the invasive surveys as they provide valuable information about the young-of-the-year. One member suggested that CDFG should think "outside the box" in developing new means of gathering data on the young-of-the-year. Specific suggestions offered by members included creating artificial habitat, using Lucite tubes to view the abalone, and using data from settlement collectors to focus the invasive surveys.

A member commented that collecting young-of-the-year for analysis is important. He suggested that chemical analyses of the shells might indicate locations where they were spawned. He said that archiving tissue samples might also be useful, noting that the samples should be from both large and small abalone.

A member commented that three index sites are too few for management decisions. He suggested that data from the three sites could be used as a trigger for more extensive data gathering efforts. He also commented that Van Damme is an anomaly and should not be used as an index site. Another member agreed that three sites is too few for management decisions, observing that an unusual event at one of the sites would have a large influence on the overall data if there were only three sites total. A member commented that the very best sites should not be chosen as index sites as they are not representative of the whole fishery. Another member suggested analyzing how well the long-term sites tracked with each other and with the area-wide surveys.

A member expressed a concern about the limited number of sampling areas outside of northern California. She commented that some people might argue based on the criteria that some areas closed under the moratorium should be opened. She and others commented that in particular, CDFG should clarify how the plan applies to San Mateo County and whether it could be reopened under the criteria.

A member observed that the proposed criteria consider population size but not population trends. She suggested that developing an index of abundance over time would be useful. Another member suggested sampling more sites to build a genetics library that would help with developing a population structure and help with enforcement efforts. A third member suggested doing a delta plot and time series analysis to help determine how typical various sites are and whether different sites fluctuate similarly. He commented that if staff and funding constraints limit research efforts, CDFG should opt for developing time series data over expanding the number of sites sampled. He also suggested sampling annually to develop the time series, though another member commented that sampling every other year may be adequate.

A member requested that CFG provide a better explanation of how recruitment will be measured and how it will factor into decision making.

Members discussed adverse events and whether the Department should develop criteria based on them. One member suggested that the Department should distinguish between reversible adverse events, such as El Niño, and non-reversible events, such as the establishment of sea otters.

- *Disease* - A member suggested that areas affected by disease should be open to fishing as lowering the population density may decrease or slow the spread of the disease. Another member, however, expressed concern that fishing might harvest out disease-resistant animals. A member asked whether Crescent City would be closed under the proposed disease criteria. CDFG staff noted that the criterion requires the abalone to show symptoms of the disease, so Crescent City would not be closed. Mr. Haaker added that Dr. Carolyn Friedman (a shellfish pathologist) has advised CDFG that the proposed disease criteria are too simplistic and the criteria may need to be expanded.
- *Poaching* - Some members expressed concern about using criteria based on poaching estimates, given the difficulty of developing accurate and reliable estimates. One member commented that the effects of poaching are already incorporated implicitly in other criteria.

- *El Niño* - A member observed that the proposed plan focused on the potential negative effects of El Niño. He commented that El Niño may also have positive effects, noting that the period of strong recruitment at Van Damme was during El Niño. He said that using El Niño criteria as a trigger for closer research on its effects may be appropriate.
- *Sea otters* - One member commented that there is nothing management can do about otters; they will deplete an area of abalone on their own. Another member commented that it is difficult to determine what constitutes establishment of an otter population. Noting that otters' presence would be detected by a change in abalone densities, he commented that otter establishment should not be a criterion, but rather criteria should focus on what is happening in the fishery. Some members suggested that areas in central California where otters are established and the abalone are surviving should be used to determine the minimum viable population level for abalone. One member commented that it remains unclear whether sea otters will establish in the north, though another member commented that it is likely they will establish over the next decades. A member pointed out that the huge population of abalone was the result of the near extermination of sea otters, which is unlikely to happen again. One member suggested that rather than closing areas as otters move in, the TAC could be lowered incrementally. Another member responded that otters should trigger the opening of areas rather than closing, to allow fishermen access to the abalone before they are depleted by the otters.

<u>Discussion on the Proposed Management Approach and Alternative Management Strategies and Refinements</u>

Focus Questions on Fishery Adjustment:

- Are the options presented in the decision tables logical?
- Do the specified sets of criteria warrant the actions listed?
- Do the listed actions provide adequate management alternatives?

Focus Questions on Alternative Management Strategies and Refinements:

- Would the new criteria improve abalone management efforts?
- Would the alternative approaches improve TAC estimates?
- Are there any additional alternative strategies that should be considered?
- Are there any additional quantitative methods to evaluate management options?

Some members noted that according to the proposed plan, the TAC would be reduced if the average population density fell below 5,000 abalone per hectare (ab/ha), the fishery would be closed if the density fell below 3,000 ab/ha, but the fishery would not be reopened until density rose above 6,600 ab/ha. They questioned why the proposed plan would allow fishing at reduced levels while the abalone population density was falling from 5,000 to 3,000 ab/ha but not while density was rising from 3,000 to 6,600 ab/ha. Some suggested that the plan should allow incremental reopening. One member suggested that an auction or lottery system be used to open

closed sites on a limited basis, with the revenue going toward research. Another member commented, however, that closed areas should not be opened incrementally when population density is increasing because the fishery will need time to build up a surplus population without fishing pressure. Other members agreed, and one noted that requiring high densities before opening an area would be especially important in the absence of recruitment criteria.

A member recommended that the decision tables allow for discretionary adjustments. He commented that when implementing the plan, CDFG will learn which criteria and methods are most effective and should allow the possibility of dropping criteria in favor of others that work better. Another member supported the idea of having a range around the criteria (a buffer) such that if stocks reach the boundaries of this range, additional studies would be triggered before changes to the fishery regulations. He commented that without such a range, closures and TAC changes could be triggered every year.

One member asked whether the plan would include a range of alternative management goals and activities as required by the Fish and Game Code. Mr. Haaker responded that CDFG did not intend to include alternative density level criteria but would include different actions to respond to the criteria. Mr. Kalvass commented that the Department would welcome suggestions of alternatives.

A member observed that Van Damme experienced a period of major recruitment and then a decade of no recruitment. He commented that under such a scenario, a model of linear increases in stocks in closed areas may not result in appropriate trigger points. He recommended that CDFG consider the timeframe for evaluating stocks and consider using models to explore the effects of the proposed management actions under different recruitment scenarios. Another member commented that settlement may be on a 10-year cycle, with one good settlement event followed by a decade of poor settlement, and such a pulse of settlement might trigger a management change under the proposed plan. He suggested that CDFG could explore the effect of the pulse using a relatively simple model. Mr. Karpov commented that an incremental increase in the TAC in response to the pulse would not likely pose a major risk to stocks. The member responded, however, that the pulse may not actually produce a surplus, but rather an occasional major settlement event may be normal and necessary for a population of long-lived animals such as abalone. He suggested that if this were true, it would argue for a conservative response to major settlement events.

Other comments and suggestions included:

- Consider developing criteria based on concentration levels.
- MPAs are more difficult to enforce than changes in bag and annual limits or season length in part because enforcement could require continuous observation.
- Education efforts to explain the plan and what is being done with money from the abalone stamp will help reduce negative reactions to management activities.
- Consider what will happen in the absence of necessary data; the proposed plan seems to indicate that the fishery would be closed if the data were not available.
- Consider developing a population model to determine which sizes of abalone are most important for population survival and growth.
- Increasing the minimum size requirement may not increase larval production as

younger abalone may be better reproducers. CDFG should examine what effect changing the minimum size requirement would have on reproduction.

Several members offered suggestions of cost effective ways to increase data collection:

- Contract commercial divers
- Use data collection partnerships
- Take advantage of volunteer programs
- Reach out to university students who are dive-certified

Public Comment

Jesus Ruiz, YMCA SCUBA Program - Mr. Ruiz commented that CDFG should look for ways to leverage research funding. He suggested that this could be done by further training researchers from other institutions (e.g., universities, junior colleges) to meet CDFG standards or by training volunteer researchers. He cautioned CDFG about raising a conflict in the Legislature or creating a social stratum by increasing license fees or establishing a lottery to open areas to a limited number of people. He also commented that the abalone fishery affects more than fishermen and has an economic impact on communities.

E. A. Flynn - Mr. Flynn commented that the Fish and Game Commission has good control of the abalone resource through existing management tools. He commented that raising the minimum size requirement from 7 inches to 7.5 inches would increase reproduction. He also noted that the size of the area being considered affects the abalone density level.

Harold. M. Hoogasian - Mr. Hoogasian offered his support of Mr. Flynn's suggestion that raising the minimum size requirement would aid reproduction. He also commented in support of establishing a lottery or some other system to allow limited opening of some areas with the revenue going toward conservation. He suggested that a similar system might also be used for limited reintroduction of commercial fishing, which would relieve some of the pressure on the resource from black market poaching.

Summary of Comments

Mr. Karpov and Mr. Haaker listed some of the comments they had heard from members and the public during the day's discussions:

- Generally the framework is sound.
- Reconsider the logic behind some of the proposed steps, and explain the rationale clearly in the plan.
- Opinions vary as to whether emergent or young-of-the-year (invasive) surveys are best.
- Three index sites are not a large enough sample for management decisions but could be used to trigger additional data collection. Sampling sites should be more

numerous and more broadly distributed.
- Time series data are important.
- Examining the vectors of population change may provide useful information.
- Given the long time between major recruitment events, build conservativeness into the framework.
- Consider adding a buffer around the criteria to allow discretion with respect to what action is triggered.
- Consider expanding recruitment criteria.
- Sea otters probably should not be a criterion.
- It is not appropriate to have an El Niño criterion at this point. CDFG should further research the effects of El Niño on abalone.
- Prioritize the research needs to assess the stocks.
- Develop new or improved research methods.
- Consider ways to cost-effectively increase data collection efforts.
- The proposed criteria do not adequately address the complexity of disease events.
- Consider management tools other than bag and annual limits and seasonal closures.
- Consider how the plan applies to the central coast.
- Provide a means for the public to evaluate how CDFG's work is affecting the resource.

Mr. Karpov commented that the input from the panels and the public was very helpful in stimulating and focusing the thinking of the CDFG staff. He said the staff will incorporate the comments offered today as they continue developing the ARMP. Mr. Haaker added that he hoped everyone at the workshop would continue to provide input to CDFG in the future.

Participants

Ben Beede	panel member
Tom McCormick	panel member
Kate Wing	panel member
Jim Curland	panel member
Jim Marshall	panel member
Gregory S. Sanders	panel member
Ron Burton	panel member
Stephen Schroeter	panel member
Thomas Ebert	panel member
Leah Gerber	alternate for Carolyn Friedman
Stephen Campi	Recreational Abalone Advisory Committee Member (RAAC)
Richard Pogre	RAAC
Steve Riske	RAAC
John Colgate	RAAC and panel member
Stephen Benavides	RAAC and panel member
Rocky Daniels	RAAC and panel alternate for Mike Henderson
Pete Haaker	Department of Fish and Game (DFG)
Kon Karpov	DFG
Peter Kalvass	DFG
Jennifer O'Leary	DFG
Mary Bergen	DFG

Jerry Kashiwada	DFG
Jim Moore	DFG
Thea Robbins	DFG
Laura Rogers-Bennett	DFG
Diana Watters	DFG
Jonathan Ramsay	DFG
Fred Wendell	DFG
Eric Larson	DFG
Frank Spear	DFG
Paul DeMorgan	Resolve, Inc.
Sarah Litke	Resolve, Inc.

Contact: Diana Watters, Constituent Involvement Coordinator, 350 Harbor Dr., Belmont, CA 94002; (650)631-2535.

G.2 Informal Public Comments

G.2.1 Town Hall Meetings

Two town hall meetings were held in Fort Bragg and Santa Barbara to receive informal public comments on the draft Abalone Recovery and Management Plan (ARMP). The objectives of the town hall meetings were to explain key features of the draft ARMP and to obtain public comments and suggestions on the draft ARMP. Presentations were given on abalone biology, status of stocks, recovery and both interim and long-term management proposals. Presentations were followed by a public comment and discussion period.

G.2.1.1 Fort Bragg Town Hall Meeting Summary

September 7, 2002
9:00 a.m. to 1:30 p.m.
Fort Bragg City Hall

The California Department of Fish and Game (DFG) held a town hall meeting in Fort Bragg on September 7, 2002, to receive informal public comments on the draft Abalone Recovery and Management Plan (ARMP). The objectives of the town hall meeting were to:

- Explain key features of the draft ARMP.
- Obtain public comments and suggestions on the draft ARMP.

<u>Welcome and Opening Remarks</u>

Konstantin Karpov, senior marine biologist, DFG, welcomed everyone and thanked them for attending the meeting. He noted that DFG was holding the meeting to receive informal public input on the development of the draft ARMP. He explained that this meeting follows a series of workshops held by the DFG, in July 2000, November 2001, and March 2002, to receive input from a broad spectrum of abalone interests and

expertise. He also explained that opportunity for formal public comment on the ARMP would follow the DFG=s submission of the plan to the Fish and Game Commission in early December. Mr. Karpov then reviewed the agenda for the meeting. He explained the terms Aprecautionary@ and Asustainable@. He introduced DFG=s presenters that would be explaining key features of the draft ARMP.

Abalone Biology and Status of the Stocks

Jerry Kashiwada, marine biologist, DFG, presented an overview of abalone biology and the status of the stocks, explaining aspects of reproduction, age and growth, disease, predation, and environmental conditions that affect abalone stocks. He explained the importance of close abalone aggregations for successful reproduction. Studies indicate that fertilization drops to 50% if abalone are more than 2 meters apart. DFG estimates that a minimum viable population level of 2,000 abalone per hectare (2.5 acres) is needed for populations to sustain themselves. He explained that abalone larvae don=t travel far and for that reason, once adult populations are depleted, it is difficult for abalone to recover. At about 4 inches in length, abalone appear in emergent surveys. Although DFG biologists see many legal-sized abalone in surveys, they have not seen good recruitment of these newly emerged abalone. Since it takes at least seven years (in the south) for abalone to grow to legal size, the legal-sized abalone that are seen now must supply the fishery for several years. Mr. Kashiwada explained the impact of disease on abalone particularly withering syndrome in black abalone, which has devastated that population in southern California. Although the bacteria that causes the disease has been found in northern California abalone, the disease has not been detected. It is thought that the colder water in northern California has prevented the disease from occurring there. Sea otters are a significant predator of abalone and will preclude a significant fishery within their range. Mr. Kashiwada went on to explain the affects that environmental factors such as El Niño and pollution can have on abalone stocks. El Niño events affect the food supply, which affects abalone growth; in addition, warmer water may exacerbate the effects of withering syndrome. Pollution can impact kelp beds, affecting a food source and abalone habitat.

In describing the status of abalone stocks in southern California, commercial landings data from before the 1997 moratorium illustrated the decline of abalone species to very low levels; the decline was caused by disease, sea otter range extension and predation, and fishing. White abalone are federally listed as an endangered species, black abalone is a candidate for federal listing, and green and pink abalones are potential future candidates. Southern California red abalone has been reduced to one remnant population at San Miguel Island.

In the northern California red abalone fishery, concentrated fishery effort and increased take, poor recruitment (few young abalone), a decline in deep water stocks, and depletion in high use areas is evident. Consideration of these factors resulted in the Fish and Game Commission=s decision to reduce the daily and annual limits for sport abalone.

A short period for clarifying questions followed.

Recovery Plan

Pete Haaker, senior marine biologist, DFG, presented highlights of the recovery portion of the ARMP. He explained that the recovery portion of the draft ARMP focuses on southern California abalone stocks (south of San Francisco). The draft ARMP=s interim goals are to: prevent extinction, rebuild populations to self-sustainability, and rebuild populations to fishable levels. The long-term goal of the draft plan is to rebuild populations to levels that a fishery could be considered. Mr. Haaker presented a conceptual model from the draft plan, which illustrates various levels of stock abundance. 6,600 abalone per hectare (2.5 acres) is considered a sustainable fishery level. From 6,600 abalone per hectare to 3,000 abalone per hectare is a precautionary zone, below which is the 2,000 abalone per hectare minimum viable population. Below the 2,000 abalone per hectare level is an at risk zone.

Mr. Haaker went on to present the draft plan=s approach to monitoring recovery, using criteria from key index sites. Criterion 1 would be broad size ranges at all index sites; criterion 2 would be self-sustaining populations, at densities of 2,000 abalone per hectare at all key locations; and criterion 3 would be an average of 6,600 abalone per hectare at the index locations in at least 3/4 of the recovery areas, the sustainable fishery level. These criteria would need to apply to each species. The number of index site locations could be re-evaluated in the event of habitat loss, environmental change, or other such factors, including sea otter reoccupation.

Mr. Haaker went on to describe the draft plan=s proposed recovery activities and their potential drawbacks, including: aggregation of emergent stock, translocation of emergent stock, and culture. Mr. Haaker explained that the timeline for recovery is likely to take decades.

A short period for questions followed.

Management B Interim and Long-term Approach

Ms. Jennifer O'Leary, marine biologist, DFG, described the highlights of the management portion of the ARMP. She explained that the proposed plan consists of an interim plan that is precautionary and short-term (2003 B 2009), and is based on limited data and imprecise management controls. The proposed long-term plan could be less precautionary because it would be based on better and more data. She again reviewed the proposed conceptual model for interim management. 6,600 abalone per hectare would be considered a sustainable fishery level, and a level at which a closed fishery would be considered for re-opening. 3,000 abalone per hectare would be the level at which fishery closure would be proposed by the Department. Again, 2,000 abalone per hectare is the minimum viable population level.

Ms. O=Leary described the draft plan=s interim management components, which include an annual total allowable catch (TAC), criteria for measuring stock conditions, and two decision tables using criteria to guide changes. She described the proposed criteria in the plan for stock conditions: recruitment (high abundance of sub-legal, emergent abalone); densities of 6,600 abalone per hectare at all depths and 3,300 abalone per hectare for deep depths, and 2,000 abalone per hectare minimum viable population; and catch-per-unit effort and serial (local) depletion (decrease in CPUE, significant increase in the distance traveled from an access point). Recruitment and density criteria would be used to adjust the TAC up or down, while CPUE, serial

depletion, and density criteria would be used to consider area closures and re-openings. Ms. O=Leary explained some of the limitations of the proposed interim management plan, including the limited amount of data available for decision making, and that the TAC applies to the entire fishery range.

The key elements of the proposed long-term management plan were described, including zonal management, use of abalone tags, and increased fishery independent data collection. The proposed target for the long-term management plan=s implementation is 2009. The proposed plan calls for a planning process for re-opening fisheries when 75% of the recovery index sites meet the 6,600 abalone per hectare criteria.

A short question period followed.

Public Comment

Mr. Ed Schulze suggested that the abalone report cards should include an explanation that the abalone need to be kept in the shell. He suggested that in order to get better compliance on returns of abalone punch cards, that the punch card system be modified to be like the deer and bear tag systems. He proposed that the system be modified so that in order to receive an abalone card, one should fill out an application, and if the card is not returned, then that person would not be eligible for a card the next season. He provided written materials on the DFG=s hunting programs for reference. Mr. Schulze proposed that a raffle system for certain areas be considered by DFG. He expressed a willingness to serve on a committee to help advise DFG in these matters. He also suggested that DFG consider an education program that includes an abalone safety course, to better educate the public on how to not fatally injure sub-legal abalone.

Mr. Mike Wilkins explained that he had an extensive background of 16 years as an urchin diver on the north coast. He stated that he thought a daily limit was alright, as well as a seasonal limit. He stated that he sees a lot of abalone, in the tens of thousands, and is sure that he could provide DFG with areas that would exceed 6,600 abalone per hectare. He also stated that he sees size ranges that are desirable. Mr. Wilkins commented that he has never been approached to participate in surveys or to provide DFG with information, and that he would be willing to help with surveys. He stated that he has observed areas that are not being fished where coastal access is limited, but even in areas where access is not as limited he sees a lot of abalone. Mr. Wilkins commented that he was skeptical of the TAC based on the survey sites that DFG uses. He also stated that tag drawings could be problematic, that people could be moved around inefficiently in such a system. Mr. Wilkins expressed a strong interest in getting involved.

Mr. Paul Weakland commented that he was disappointed with DFG because his questions have not been answered. He submitted a report that he wrote entitled ACalamity California@, and dated November 1997. He expressed concern about withering syndrome. He stated that if his questions were answered, the DFG would not need to hold public meetings. He commented that the DFG had not done a good job responding to comments. He stated that the DFG needed to state the level of error in their data.

Mr. Gene Kramer commented that he liked the density criteria proposed in the draft ARMP. He also commented that he thought the TAC was appropriate. He suggested that a zonal management approach would need to be fine scaled enough to allow individual beaches a rest. He suggested that underwater scooters would allow the DFG to cover more area in their surveys, which would help in areas with low abalone densities.

Mr. Ed Flynn commented that all indications are that there are a lot of abalone out there in the north. He stated that the DFG=s survey efforts should be focused on divers, not shore pickers, and that diving should be defined at greater than 10 feet.

Ms. Mary Lorenz commented that she agreed with Mike Wilkins, that the divers that she knows see a lot of abalone. She suggested that the DFG take advantage of local people who know the coastline. She stated that the ARMP does not contain an education component, which needs to be emphasized. Ms. Lorenz suggested that an abalone education program be similar to a hunter safety program and that such a course be a requirement for obtaining an abalone card. She suggested that any closures be implemented on a rotating area basis, not total closures. She also suggested that DFG include night dives as part of their diving surveys. Ms. Lorenz also commented that DFG should make available the scientific papers that it cites, not just the citations, because it is difficult for the public to locate scientific papers. She also requested that the DFG hold another town hall meeting in Fort Bragg to allow more people to attend.

Mr. Fonseca commented that he thought that DFG=s enforcement was doing a good job. He stated that it was difficult to find follow-up reports on research that had been done. He also commented that there is a tremendous resource of local divers that DFG is not utilizing. He suggested that any peer review of the ARMP include the international community, and that the recovery in New Zealand has been phenomenal. He expressed alarm over the outplanting of abalone on the north coast and the potential for disease. Mr. Fonseca commented that the DFG is not using good science. He suggested a scientific study of outplants to check for disease, with only those without disease being used for outplants. He stated that the quarantine policy of the DFG has not been adequate. He commented that imported animals must be quarantined.

Mr. Bob Janetz commented that there is plenty of abalone. He stated that he is in favor of closing areas that need it, but doesn=t want continued take reductions. He stated that the three sites used for data collection are not representative. He suggested translocation of abalone. Mr. Janetz stated that he appreciated the meeting.

Mayor Jere Melo submitted written comments. He stated that the first that he was aware of the meeting was from the local newspaper on August 29, and that because of that, there wasn=t enough time for all council members to provide comments by the morning of the town hall meeting. He thanked the DFG for holding a town hall meeting in Fort Bragg. He expressed how important abalone is to the residents of the Mendocino coast, as a food source, and as an important component of the local economy. He stated that local residents see poaching as a serious threat to abalone stocks, and that the sport abalone fishery helps in deterring poaching through the presence of sport divers. He encouraged the DFG to seek improved public access to the coast. He commented that the ARMP should allow for collection of data on a

statistically sound basis. He expressed concern with no take abalone preserves, stating that poaching in these areas could be a problem. He invited DFG staff to provide updates on abalone management at City Council meetings.

Summary and Adjournment

Following a break, the DFG staff presented a summary of the verbal comments that they heard at the meeting. Mr. Karpov thanked the audience for attending and providing the DFG with their comments. The meeting was adjourned.

G.2.1.2 Santa Barbara Town Hall Meeting Summary

September 14, 2002
Time: 9:00 a.m. – 1:30 p.m.
Location: Buchanan Hall, University of California, Santa Barbara

The California Department of Fish and Game (DFG) held a town hall meeting in Santa Barbara on September 14, 2002, to receive informal public comments on the draft Abalone Recovery and Management Plan (ARMP). The objectives of the town hall meeting were to:

Explain key features of the draft ARMP.
Obtain public comments and suggestions on the draft ARMP.

Welcome and Opening Remarks

Fred Wendell, Nearshore Ecosystem Coordinator, DFG, thanked those in attendance for their interest and for taking valuable time to help the DFG with the process of developing the draft ARMP. He explained that the DFG would give presentations on the key components of the draft ARMP, and then comments would be received. Comments will be considered in the process of revising the draft. He went on to explain that for the current informal comment process, each comment will not be responded to directly, but will be summarized and included in the draft ARMP. Mr. Wendell encouraged the audience to focus comments on how to improve the draft ARMP.

DFG staff present were introduced. Members of the audience introduced themselves. Mr. Wendell directed the audience's attention to a handout of the Fish and Game Code sections that guide the content of the ARMP. He reviewed the public input process to date, and then explained that once the draft ARMP is submitted to the Fish and Game Commission, a formal public comment period will begin. He explained that formal public comments will be responded to.

DFG Presentations

Abalone Biology and Status of Stocks

Jerry Kashiwada, marine biologist, DFG, presented the biology and status of the stocks components of the draft ARMP. He began by explaining factors which affect the status of stocks, focusing on age and growth, reproduction, disease, predation, and

environmental conditions. Mr. Kashiwada explained that one important component of reproduction that affects abalone includes the minimum viable population (MVP) level, which is the minimum abundance at which populations can sustain themselves. Studies have shown that when abalone are spaced more than two yards apart, only 50% of abalone eggs are fertilized. Abalone larvae do not disperse far, thus population recovery is slow. Research has indicated that the MVP is 2,000 abalone/hectare (2.5 acres). An important factor of abalone reproduction is that it is sporadic. In1989 and 1990 there was a successful recruitment of young abalone, but none since then.

Mr. Kashiwada discussed abalone age and growth, which might be affected by environmental conditions. It takes about seven years for abalone in southern California to reach legal size and about 13 years in northern California, a result of different environmental conditions and food availability.

Mr. Kashiwada reviewed disease concerns for abalone particularly withering syndrome in southern California. He stated that although the bacteria that causes the disease has been found in a few individuals in northern California, no abalone in the region have been found showing signs of the disease. Research indicates that colder water temperatures on the north coast prevent the occurrence of the disease there.

It was explained that while humans and sea otters are major predators of abalones, sea otters will preclude a fishery within its range.

Mr. Kashiwada next addressed the status of abalone stocks. He explained that generally the stocks in southern California are in poor condition. White abalone is listed as an endangered species, black abalone is a candidate for listing under the Endangered Species Act, and pink and green abalones are potential future candidates for listing. Red abalone populations are mostly limited to San Miguel Island. He noted the concerns about the northern California red abalone resource and fishery including concentration of fishery effort, irregular recruitment of young abalone, deep water stock decline, and serial (local) depletion (fishermen having to travel farther from access points to get abalone) in high use areas. He added that although there are many legal-sized abalone present today, the lack of recruitment of young abalone means that the large abalone present now will need to last for at least the next 10 years.

Clarifying questions and answers followed.

Recovery

Mr. Pete Haaker, Senior Biologist, DFG, presented key features of the recovery portion of the draft ARMP. He explained that the recovery part of the ARMP applies to white, black, red, green, and pink abalone in southern California and red abalone at San Mateo Point and the Farallon Islands. Mr. Haaker stated that the draft plan proposes a seven-year timeline to implement interim recovery goals: prevent extinction, rebuild populations to self-sustaining levels, and rebuild populations to fishery levels. The long-term goal of the plan is to reach levels where a fishery would be considered.

Mr. Haaker described a conceptual model from the ARMP that illustrates recovery of stocks from current levels. Southern California red abalone is currently at sustainable levels at one island, but pink, green, white, and black abalones are below

minimum viable population levels. Proposed target minimum viable population levels are 2,000 abalone per hectare (2.6 acres), and fishery consideration would occur at 6,600 abalone per hectare. These levels are adaptable and could be changed when recovery occurs.

Mr. Haaker described three criteria to use in assessing the status of stocks. Criterion 1 would be a broad size range at many sites, which indicates growth and good reproduction. Data for this criterion would be collected from swim surveys. Once Criterion 1 was met, then density surveys could be used to evaluate Criterion 2, which would be 2,000 abalone per hectare, the minimum viable population level. Criterion 3 would be density of 6,600 abalone per hectare, the level at which a fishery could be considered. The criteria would apply to each individual species, at all index sites for criteria 1 and 2, and at 75% of the sites for criterion 3.

Mr. Haaker explained that the draft plan is adaptive, that index locations could me modified due to habitat loss, sea otter expansion, or environmental change. He noted that if recovery areas declined by 50% for a particular abalone species, then there would not be a fishery for that species, because of reduced biological capacity.

Mr. Haaker described activities that the plan uses for recovery. Aggregation, or moving abalone closer together, could help with reproduction, but has potential problems with handling and poaching and the source of individuals. Translocation, or moving abalone to other areas to re-establish them is another activity described in the plan, with similar potential problems to aggregation. Culture, or breeding abalone in captivity is another possible activity described in the plan; its drawbacks include cost, and past outplanting activity has been problematic. Mr. Haaker explained that future activities would depend on what happens in the interim period. He cautioned that the recovery period is likely to be a long one.

Clarifying questions and answers followed.

Management – Interim and Long-term Approach

Ms. Jennifer O'Leary, marine biologist, DFG, described key features of the management portion of the ARMP. She explained that the proposed plan consists of interim and long-term parts. The interim part is precautionary and short-term (2003 – 2009), and is based on current limited data and management. The proposed long-term plan could be less precautionary because it will be based on more data and allow more precise management of the fishery. She reviewed the proposed conceptual model for interim management. 6,600 abalone per hectare would be considered a sustainable fishery level, and a level at which a closed fishery would be considered for re-opening. 3,000 abalone per hectare would be the level at which fishery closure would be proposed by the Department. Again, 2,000 abalone per hectare is the minimum viable population level.

Ms. O'Leary described the draft plan's interim management components, which include an annual total allowable catch (TAC), criteria for measuring stock conditions, and two decision tables using criteria to guide changes. She described three proposed criteria in the plan for stock conditions: 1) recruitment (high abundance of sub-legal, emergent abalone); 2) density (6,600 abalone per hectare at all depths and 3,300 abalone per hectare for deep depths, and 2,000 abalone per hectare minimum viable population); and 3) catch-per-unit effort (CPUE) and serial

(local) depletion (decrease in CPUE, significant increase in the distance traveled from an access point). Recruitment and density criteria would be used to adjust the TAC up or down, while CPUE, serial depletion, and density criteria would be used to consider area closures and re-openings. Ms. O'Leary explained some of the limitations of the proposed interim management plan, including the limited amount of data available for decision making, and that the TAC applies to the entire fishery range.

The key elements of the proposed long-term management plan were described and include: zonal management, abalone tags, and increased fishery independent data collection. The proposed target for the long-term management plan's implementation is 2009. The proposed plan calls for a planning process for re-opening fisheries when 75% of the recovery index sites meet the 6,600 abalone per hectare criteria.

A short question period followed.

Public Comments

Mr. Steve Rebuck commented that the patch dynamics of abalone should be considered, because even though habitat may look good for abalone, they may be absent. He stated that suitable habitat doesn't necessarily mean that abalone will be there. He suggested that DFG use commercial divers to help locate abalone. Mr. Rebuck questioned what had happened to the 45,000 to 50,000 abalone being taken at the time of the fishery closure, and stated that they were continuing to grow and reproduce. He stated that he thought that there was some stability in the fishery at the time of closure. He stated that survey work was needed at the Farallon Islands and mainland. He suggested that otter areas should be considered for fisheries and that the plan needed to be strengthened with regard to otters. Mr. Rebuck stated that a commercial fishery should be considered at the Farallon Islands. He also stated that there are a lot of abalone at Van Damme. He stated that some of the plan's goals were unrealistic, that we can't return to prehistoric levels. Mr. Rebuck suggested quotas and slot fisheries would be effective management tools. He agreed with Don Thompson that the DFG has not delivered what it promised. Mr. Rebuck submitted a plan for ITQs in southern California. He stated that 50% of red abalone landings were made by 10 divers, and that the transferability of permits is a good idea. Mr. Rebuck stated that he would like to see electronic devices used to track fishermen. He stated that in 1991 he submitted a plan for using tags at the request of Earl Ebert, and was pleased to see that tags were in the plan. With regards to stock assessment, Mr. Rebuck commented that the DFG's 1997 cruise report stated that commercial sized abalone were 1.2% of the population, and that he thinks that there are 4,000,000 abalone available to harvest south of San Francisco.

Mr. Mark Becker disagreed with the DFG's statement that it takes from 10 to 14 years for abalone to reach legal size. He stated that Johnson's Lee data is wrong, and needs to be re-addressed. He stated that the decline data was wrong and that the die-off at Palos Verdes needs to be re-addressed. He commented that data from block 690 need to be verified, and suggested that fish tickets be linked to fuel receipts to prove that block 690 produced the abalone that were shown from there. Mr. Becker expressed concern about the movement of abalone, the effects of

copper piping on them, and rickettsia. He stated that the DFG needs more stringent controls over spread of disease. He commented that the science that was presented was poor, and that the plan is skewed. He stated that the plan needs new science collected with the cooperation of fishermen, and that studies need to be developed now.

Mr. Paul Weakland commented that he did not receive the postcard announcing the town hall meeting until late, and that the meeting was scheduled on the same day as an urchin meeting. He also commented that many people don't have Adobe Acrobat which is needed to view the ARMP on the internet. He commented that the 6,600 abalone per hectare number is too precautionary and not realistic. He stated that the minimum viable population level figure should be reduced to 1,200 abalone per hectare, and that all of the numbers should be reduced. He stated that divers are stewards of the resource, and that withering syndrome is poisoning the roots of the abalone resource. He stated that disease is being ignored. Mr. Weakland stated that the DFG is lying about sabellid worms and withering syndrome. He commented that the seven-year time line needs to be retroactive to the closing of the fishery. Mr. Weakland commented that he is offended that the ARMP is dedicated to Mia Tegner, and that that dedication should be removed.

Mr. Jim Marshall commented that pre-emergent abalone should be looked at for recruitment.

Mr. Jim Finch questioned what was meant by deep water and commented that free diving is becoming popular in southern California, so the DFG should consider that 25 feet is not that deep. He stated that poaching in northern California is a big problem. Mr. Finch commented that he believes in outplanting and thinks it works. He stated that divers saw results of outplanted abalone that became harvestable, but were discouraged when those abalone were wiped out by recreational fishermen. He stated that adequate penalties were needed to discourage poaching. Mr. Finch stated that tags were a good idea, and that education was needed. He suggested that fishermen not be allowed to take abalone without adequate education on handling them. He stated that the sport abalone size should be increased. He also stated that he starts to see abalone at 7 inches to 7.25 inches, and that a 7-inch size limit is a crime.

Mr. Mike Shane questioned the 6,600 abalone per hectare density, asking if that number was achievable in southern California. He asked that the plan be adaptable if that number was not possible for southern California. Mr. Shane also questioned the use of transplantation because there have been no genetics studies. He suggested that the plan contain a plan to do genetics work before translocating to avoid problems. He questioned whether there were plans to generate money from outside of the DFG. Mr. Shane commented that he didn't want to see the DFG five years down the road saying that we didn't have the money, and to make sure that the plan contains all potential sources of funding.

Mr. David Kushner commented that although fishermen say that biologists don't know how to find abalone, he believes that they do. He commented that an apprentice program is needed to train future people to identify and find abalone, because fishermen and biologists are a dying group of people. Mr. Kushner

commented that the plan needs to clarify that threaded and pinto abalone are the same. He stated that we don't know what is going on with threaded abalone, that they have re-appeared, and that should be addressed. He stated that northern California populations should be looked at separately from southern California populations. He commented that there is no evidence that withering syndrome has affected red and pink abalone, and that that statement should be removed. Mr. Kushner commented that protection education needs to be emphasized more. He stated that the plan needs to document attempts at translocation and aggregation to look at successes and failures, in particular failures, since these are often not published.

Mr. Don Thompson complimented the plan's use of contingency tables in making decisions. He expressed concern about lack of data from only three sites. He commented that a biomass estimate is needed for abalone, and questioned why the DFG had not extrapolated the data index sites to biomass estimates. He stated that he wanted the DFG to stop grouping data over a long period. Mr. Thompson stated that a status report is needed to document recovery of abalone since the fishery closure. He commented that subjective statements should be removed from the ARMP and asked for more quantitative, statistical information. He stated that all of the information from the former plan, including public comments be included. Mr. Thompson stated that the DFG ceased progress, and rescinded on promises made on a management plan for a fishery. He stated that in 1997 John Duffy stated that it was time to consider a possible re-opening of fisheries in southern California. He recalled a Fish and Game Commission meeting at which it was stated that the DFG was on its way to getting biomass estimates for abalone, and the DFG still doesn't have them. Mr. Thompson commented that he was angry about how the DFG is handling the delivery of the management plan, because DFG has not delivered what it said it would do.

Mr. Bob Duncan expressed concern about poaching and questioned how the DFG planned to protect areas where 6,000 abalone per hectare exist. He emphasized that enforcement needed to be better addressed. He stated that the plan needed to include a study of how threaded abalone have returned, and the ability for abalone to bounce back on their own.

Following a break, DFG staff presented a summary of the oral comments received that day to the audience. Mr. Fred Wendell again thanked those present for attending the meeting and providing valuable input. The meeting was adjourned.

G.2.2 Recreational Abalone Advisory Committee (RAAC) Meeting

Oral comments on the ARMP were received from members of the RAAC at their meeting in Los Alamitos, September 21, 2002. The following is a summary of those comments.

ARMP review and recommendations by RAAC

Prior to the meeting, members of RAAC were asked to read the draft ARMP and give the department their questions and comments. A brief presentation was prepared for RAAC. The committee declined so they could have more time to

discussing the plan.

Campi asked if the daily poaching numbers of 4,800 abalone a day in were correct. It was indicated that in 1997 that was the number the department came up with. Colgate was concerned about the lack of index sites listed in the plan. He also wondered what would happen to a site which became populated with sea otters and if so would we choose a new site. A similar concern arose about the effects that pollution and temperature can have on a site. Campi asked what PISCO was and it was explained that they are a surveying; marine monitoring organization ran through University Of California Santa Barbara and University of California Santa Cruz. They are similar to the Channel Island Research Institute and groups like this will be very helpful in obtaining data which we are lacking.

Colgate was confused on broad size distribution as discussed in the plan under criterion 1. Haaker explained that we want to see the size distribution discussed in criterion 1 in all index cites. It was questioned on how much time will be spent at the index sites. This will help point out that a density survey is warranted, but we need more resources to do this.

Pogre was concerned that the Farallon fishery was closed due to a small percentage of poachers and it was unfair to preclude a fishery due to a few poachers. He was also concerned about commercials lying on their landing receipts by marking down North Coast poached abalone as Farallon abalone. Lt. Morse discussed a case where they tracked a commercial fisherman who transported 600 marked north coast abalone and reported them as Farallon abalone. Pogre commented that most abalone fishermen have changed their attitude and understand that any new abalone fishery will not be a free for all. The remaining commercial fishermen have more respect for the fishery.

If 25% of MPA's are implemented, what effect will this have on the fishery? MPA's are a vital component of recovery but percentages are unknown. Karpov pointed out that the north coast already has a 15% defacto refuge because abalone located in deeper water can not be reached by free divers. Recovery needs some areas of total protection. They need aggregation to spawn and no take zones are vital for this.

Campi was concerned that the San Mateo coast surveys need to be done. Shift opening of the San Mateo coast from short term to long term. This would help to relive pressure from the north coast. This assessment should be made a priority and should be conducted sooner than 2006.

Danniels commented that in the past he had anxiety over past RAAC material but overall was very impressed with the draft ARMP. He pointed out that interim and long term goals have no alternatives which fall short of the legal requirements from the fish and game code section 5022A. Their was also some concern about the characterization of sea-otter and abalone long lived coexistence, which allowed maintenance of stable low density abalone populations. Danniels pointed out that there were some areas of high density areas.

Benevides was interested in fines money from abalone violations were going into the abalone fund. Riske said we are right now. Benevides was also interested if the laws and penalties were enough to protect the resource. Riske added that the commercial guidelines had been lowered from 30 to 12 abalone in possession. He

added that WLP has had special meetings with Mendocino's and Sonoma's Judges and District Attorneys to emphasize the importance for stiff fines and harsher sentences. Benevides again stated the importance of more enforcement is needed and that if we can not come up with more enforcement then the penalties for violations need to be harsher. A discussion about paper fines verses resource fines confirmed that some people fill out the abalone punch cards wrong and they are trying to be legal. A paper violation should not receive the same fine as someone who committed a resource violation. It was suggested to increase the resource violation and separate the two.

Benevides, who is also a member of on one of the Marine Life Protection Act Working Groups, stated that the MLPA process needs to hear from the abalone team for suggestions on areas for protection. Furthermore, MPA's need to be implemented right now and the MLPA process are moving too slow. Danniels suggested that RAAC needs to submit a letter, similar to Dr. Mia Tegner previously submitted to the department, to point out the importance of MPA's right now. This letter could be submitted to the commission, director and MLPA lead biologists.

A question about the sunset date for the DAAC funds and where they would go if lost. Campi clarified that the sunset date had been extended and the money will not be lost.

Pogre was concerned about central California Red abalone and that if a fishery did open in that part of the state the commercial fishery should not be left out. He added that assessment is necessary in the near future and that a commercial fishery would help relive some pressure on the north coast.

Colgate was upset that the plan had not been given to RAAC or the ARMP advisory panel, so their comments could accompany the document to the peer reviewers. No alternatives in the plan give a continued separation between the commercial fisherman and the department. He also thought that white abalone had plenty of funding from the federal government and that the state would better spend its limited time and resource on the Red abalone which can achieve a minimal viable population, unlike the white abalone. Colgate was also concerned that if sea otters move into an area which historically was unpopulated, would we let the sea otters decimate the abalone population. If this happens then a fishery for both sport and commercial fisherman should be open until the population reaches the 2000 abalone per hectare. Why should the sea otters be able to destroy the population? Colgate was also interested in the Farallon Island assessment be moved from long-term to interim goal. An assessment of the islands is needed as soon as possible.

Pogre believes that the recreational fishery lines should be moved south to Pigeon Point. He also believes that pigeon Point would be a great index site.
He also added that the Farallon islands would be a good index site for the south. Pogre added that fishermen have developed a new attitude. They realize that they have a lot of money to loose and that they will as a whole respect the resource more than they did in the past.

Danniels felt that there need to be more index sites on the north and that there should not be a fishery on the Farallon islands.

Campi was concerned that the ARMP did not follow the Marine Life Management Act (MLMA) guidelines. He thought that in the future, MLMA should

guide changes in the ARMP even though the ARMP is not currently under the MLMA process now.

Campi was curious about differences between starving abalone and an abalone with withering syndrome. He added that two shrunken abalone were recently found on the north coast. Haaker explained that a hungry abalone will metabolize the foot thus causing foot shrinkage. Haaker reminded that even if an abalone has the withering syndrome bacterium, the low water temperature in north coast waters does not allow the bacterium to take over. He added that all abalone with a shrunken foot should be sent to the Bodega Bay Marie lab for assessment.

RAAC members present:
Steve Campi
Rocky Danniels
Richard Pogre
John Colgate
Steve Benavides
Lt. Steve Riske

G.2.3 Written Comments

Written informal comments on the ARMP came in the form of letters, FAXes, and email. The deadline for submission of written comments was 5:00 p.m., October 4, 2002. Written comments received are available on request, but are not appended to the plan. Comments that were considered relevant to the plan are included in the "Summary of Informal Public Comments", section G.2.4.

G.2.4 Summary of Informal Public Comments

All of the written comments, and oral comments received at the town hall meetings and the RAAC meeting, were reviewed and considered by Department staff. Comments that were considered relevant to the plan and were focused on improving it were considered further. If a comment or correction improved the plan, it was incorporated into the plan; if it was not found to improve the plan, it was not incorporated into the plan. To process all of the comments for consideration, each person who provided comments was assigned a number and each page of their comments was assigned a consecutive number, including the oral comments received at the town hall and RAAC meetings. Several people provided additional supporting documents to their written or oral comments. The supporting documents were assigned a lower case letter along with the person's number (ie. Person 1=written comments and 1a=supporting documents). All of the written comments that were received are available on request, but are not appended in the plan.

The following table summarizes the comments that were considered relevant to the ARMP and were focused on improving it. Comments are not responded to individually, but rather summarized into categories in the 'Comment' column of the table. The 'Source' column lists the numbers of people who provided each comment and refers to the page number of that person's comment. General responses to comments, when appropriate, are listed in the 'Response' column. Following this

table is a second table, which lists the names of those who commented, their assigned number, and whether their comment was written or oral.

Table G-1. Summary of informal pubic comments on the draft ARMP.

Comment	Source No. = commenter, (pg. no. of comment or appendix G - FB=Fort Bragg TH, SB=Santa Barbara TH, LA=Los Alamitos RAAC meeting)	Response
Education		
There is a need for better education about abalone resource	8 (info signs), 5 (app. G-FB), 24 (app. G-SB)	
punch card should say keep abalone attached in shell	5 (app. G-FB)	
Education program should be tied to receiving punch card	19 (app. G-FB), 22 (app. G-SB)	
Papers cited should be provided	19 (app. G-FB)	
Legal Framework		
ARMP and CEQA compliance	1a (pg. 5), 14	sec. 4.2.2 - added
ARMP and MLMA	12 (pg. 7)	sec. 4.2.3 - added
ARMP and ESA	12 (pg. 8), 14	sec. 4.3 - modified sec. 6.5.2.5 - modified
Biology		
Allee effects	1 (pg. 5)	refer to sec. 2.1.2.2 - (Allee effects) refer to sec. 2.1.9 - mortality
White abalone status	1 (pg.9), 12 (pg. 7)	refer to sec. 2.2.5 - modified
Red abalone status at San Miguel Island	1 (pg. 11), 12 (pg. 2)	refer to sec. 2.2.1.2 - modified exec sum. Pg. I - modified
Flat and pinto abalone should not be referred to as rare	1a (pg. 11), 15 (pg. 4), 25 (app. G-SB)	sec. 2.2.6 - modified
include cite of Tegner et al. 2001 regarding importance of El Nino events	12 (pg. 5)	sec. 2.1.9.2 - modified lit. cited - modified
question the optimal temperature for southern Cal. Red abalone	12 (pg. 5)	sec. 2.1.12.2 - modified

Revise fig 2-2 San Miguel Is. Ab abundance data for 1974	12 (pg. 5)	fig. 2-2 - modified
inadequate data to assess trends at the Farallon Is. and Fitzgerald Mar. Reserve	12 (pg. 6)	sec. 2.2.1.2 - modified
H. assimilis taxonomy (sp vs. subsp.)	14 (pg. 5), 24 (app. G-SB)	sec. 1.1 - modified Sec. 2.1 - modified
Define central California area	14 (pg. 7)	Refer to fig. 1-1
How can it take 14 yrs for a red abalone to reach 7" when studies report that they grow on average 1" per year	15 (pg. 3)	Refer to sec. 2.1.6 and table 2-3 - added
Include description of stocks in otter areas	32	
Include estimate of age at maturity	32	Sec. 2.1.2.1 - modified and table 2-1- added
Include statement about age and growth dynamics are shorten in presence of otters	32	
Recovery		
Clarification between emergent recovery levels and sustainable levels in otter areas	1 (pg. 6), 14 (pg. 3)	Fig. 5-1 - modified Glossary - modified (add at risk def.)
Density criteria	1 (pg. 7, pg. 12), 14 (pg. 8), 15 (pg. 1), 18 (app. G-FB), 23 (app. G-SB)	refer to sec. 6.2.2 - modified sec. 6.2.3 - modified refer to sec. 7.1.2.1 criterion 2
Engaging constituents in data collection for recovery	1a (pg. 4), 12 (pg. 11)	refer to sec. 6.4.1
ARMP lacks alternatives to recovery	1a (pg. 7), 12 (pg. 4, 8), 15 (pg. 7), 32	sec. 6.8 - added
provide estimates of time to reach density goals	1a (pg. 7)	refer to sec. 6.7
present status of recovery since closure of the fishery	1a (pg. 8)	refer to sec. 6.6.1.1 Task 1
do not eliminate pinto and flat from future fisheries	1a (pg. 8), 11	modified plan to include minor species
State resources should be directed at red abalone rather than white abalone	26 (app. G-LA)	
continue to develop methods to increase assessment abilities	11	refer to sec. 7.2.3

aggregation/translocation experiments seem unlikely to succeed	11, 15 (pg. 42), 24 (app. G-SB)	refer to 6.4.2.1
include contingencies for black abalone if listed under ESA	11	
Incorrect FG code section cited in justifying criterion 1	12 (pg. 9)	sec. 6.2.1 - modified
identify reproductive connectivity between index sites and among recovery areas	12 (pg. 10), 15	refer to sec. 6.4.1.3
assessments for recovery is too infrequent (5 yrs. Too long)	12 (pg. 10)	sec. 6.4.1 - modified refer to table 9-1
task 9 should occur before tasks 4-8	12 (pg. 11), 23 (app. G-SB)	sec. 6.6.1 - modified refer to table 9-1
Using the 6600 ab/ha density based on Australian data is not appropriate	14 (pg. 3)	Refer to sec. 7.1.2.1 pg. 7-4 criterion 2
One-size-fits-all is not a realistic approach	14 (pg. 3), 15, 23 (app. G-SB)	sec. 6.2.2 - modified
Do not relocate red abalone from SMI to other sites	14(pg. 11)	
Out planting feasibility	15 (pg. 3)	Refer to sec. 6.6.1.2 and sec. 6.6.1.3
What are the recovery techniques	15 (pg. 6)	Refer to sec. 6.4.2
What are the key index sites	15(pg. 21)	Refer to tables 6-3 through 6-8
Disease is not adequately addressed	15, 16 (app. G-FB), 21 (app. G-SB)	Sec. 2.1.9.1 pg. 2-6 - modified
Add Farallon is. and San Mateo coast to recovery index sites	6 (app. G-LA)	Table 6.3 - modified
Management		
Allocation of resources between Recreational and Commercial fisheries	8	
Daniels and Floren (1998) citation on Pg 7-17 is misleading	1a (Comment 50), 14 (pg. 3)	Sec. 7.1.4.3 - Modified
Alternative goals for management	27 (app. G-LA)	Sec. 7.3 - added

provide a range of alternative target densities which correlate with exploitation rates	1a (pg. 11)	refer to sec. 7.1.2.2 and table 7-2
require abalone report card for individuals under 16 yrs. Of age	5	sec. 7.1.1.7 - modified
assessment protocols	8 (3)	refer to app. E
add Gerstle Cove to sec. 7.1.2.4	12 (pg. 11)	sec. 7.1.2.4 - modified
How do amendments to plan occur	15 (pg. 5)	Refer to sec. 4.4
Adaptability of plan to environmental changes	15 (pg. 6)	Refer to sec. 7.1
Add Punta Gorda to sec. 7.1.2.4	15 (pg. 16)	sec. 7.1.2.4 - modified
Increase minimum size to 7.75 in.	15 (pg. 54), 22 (app. G-SB)	
Socio-economic data needs is lacking	15 (pg. 76)	Sec. 3.2 - modified
Rotating Zonal management	18 (app. G-FB), 19 (app. G-FB)	
Fishery		
Initiate a complete abalone moratorium until numbers increase	3	sec. 7.3.6 - added
Initiate a tag program	5 (app. G-FB), 14 (app. G-SB), 22 (app. G-SB)	refer to sec. 7.1.3.2
Redesign report card system to prevent multiple purchases and insure compliance with returns i.e. application for report card	5	sec. 7.1.1.7 - modified
Determine biomass estimates for all abalones to better manage fishery	1	
Open limited commercial take in areas not easily accessed in northern California	4, 15 (pg. 8)	refer to app. B §5521.5
Reopen areas from Pigeon Pt. north, and the Farallons to take of abalone (commercial and/or recreational)	1, 6, 7, 8, 9, 10, 12 (pg. 11), 14 (pg. 6), 15 (pg. 16), 10 (app. G-LA), 29, 31	sec. 7.1.4.3 - Modified

Include Pigeon Point to Pescadero Creek a fishing area for consideration.	6	
explain concept of "depleted fishery"	1a (pg. 10)	glossary - modified
open private areas to public access	4, 13 (pg. 2)	refer to sec. 4.1.2
economic values of commercial and recreational fisheries are not directly comparable	12 (pg. 2), 14 (pg. 7)	exec. Sum. Chap. 3 - modified sec. 3.2 - modified
no. of permits in 1997 was 103	12 (pg. 7)	sec. 3.1.3.1 - check no. permits at closure
Oppose any commercial fishery in northern Calif.	13 (pg. 2)	
Have a fishery at San Miguel is.	14 (pg. 8)	
Consider raffle system	5 (app. G-FB)	
Consider ITQs in fishery	14 (app. G-SB)	
Consider using electronic tracking devices to track comm. fishermen	14 (app. G-SB)	
No commercial fishery at Farallon is.	27 (app. G-LA)	
Allocation between recreational and commercial fisheries	8	
Research		
Surveys - more needed in broader and more areas or better data	8 (specific index sites), 15 (pg. 58), 17 (app. G-FB), 20 (app. G-FB), 21 (app. G-SB), 10 (app. G-LA), 27 (app. G-LA)	
Monitor environmental factors (kelp beds abundance, El Ninos, etc).	8	
Need abundance/biomass estimates for better management	1 (pg. 11-12)	refer to Sec. 7.2.3
Collaborative research efforts should include diver constituents	12 (pg. 12), 17 (app. G-FB), 19 (app. G-FB), 16 (app. G-FB), 14 (app. G-SB), 21 (app. G-SB)	refer to sec. 6.4.1

Need a stock assessment	14 (pg. 2)	refer to sec. 6.4.1
Include night time surveys	19 (app. G-FB)	
Include international community in peer review of plan	16(app. G-FB)	
Wildlife Protection		
increase protection	11, 13, 15 (pg. 4), 22 (app. G-SB), 25 (app. G-SB), 27 (app. G-LA)	
Marine Protected Areas		
Identify and establish potential MPAs for abalone recovery (coordinate w/ MLPA process)	11, 15 (pg. 53), 27 (app. G-LA), 30	refer to sec. 6.4.2.4 and 7.1.1.3
New MPAs and enforcement issues	13 (pg. 2)	
Suggest rotating MPAs	14 (pg. 10)	
MPAs will not help abalone recovery	15 (pg. 15)	
Sea Otter		
Take action to gain State control of sea otters	2, 8, 14 (pg. 4)	refer to sec. 4.3
Determine the density level of abalone in the sea otter=s range? For comparison with areas outside otter range.	1, 8	
Consider re-opening areas where sea otter re-colonization is imminent.	1a (pg.8), 6, 9, 26 (app. G-LA)	Sec. 7.3.3 - added
Consider a fishery within otter areas	14 (pg. 4)	Sec. 7.3.4 - added
Plan for recovery is useless if otters recolonize recovery areas	2, 8, 14 (pg. 4),15 (pg. 26)	refer to sec. 4.3 Sec. 6.8.1 - added
Miscellaneous		
change the word “would” to “could” in last sentence of sec. 8.3.3 (now 9.3.3)	12 (pg. 12)	sec. 9.3.3 - modified

Misleading language	1a (pg. 10)	refer to glossary
Docent program (volunteer)	2, 8	
Measurements should be in English units	15 (pg. 20)	
Identify all funding sources for plan implementation	23 (app. G-SB)	
Abalone biologist in Santa Barbara area	32 (pg. 1)	

Table G-2. List of people providing public comments		
Commenter number	**Name**	**Comment type (W=written, O=oral)**
1, 1a	Don Thompson	W, O
2	Edward A. Flynn	W, O
3	Kristin Phillips	W
4	Earl Reid	W
5	Ed Schultze	W, O
6	Richard Pogre (RAAC)	W, O
7	Harry Vogl	W
8	Hank Lindemann	W
9	Jim Goodwin	W
10	Steve Campi (CenCal Divers, RAAC)	W, O
11	Tim Setnicka (CINP)	W
12	Jim Marshall	W, O
13	Mayor Jere Melo (Fort Bragg)	W
14, 14a	Steve Rebuck	W, O
15, 15a	Paul Weakland	W, O
16	John Fonseca	O
17	Mike Wilkins	O
18	Gene Kramer	O
19	Mary Lorenz	O
20	Bob Juntz	O
21	Mark Becker	O
22	Jim Finch	O
23	Mike Shane	O
24	David Kushner	O
25	Bob Duncan	O
26	John Colgate (RAAC)	O
27	Rocky Danniels (RAAC)	O
28	Steve Benevides (RAAC)	O
29	Robert Spencer	O
30	Kate Wing (NRDC)	W
31	Linda Meyer	W
32	Harry Liquornik	W